THE JOURNAL OF GAS LIGHTING
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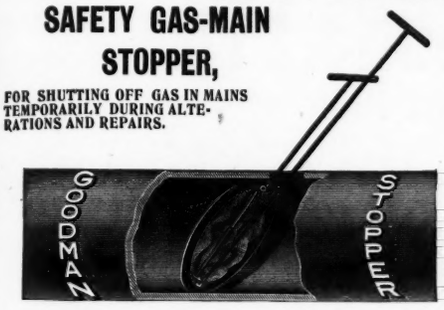

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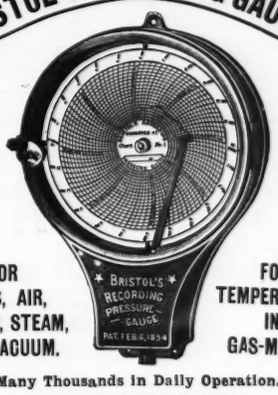

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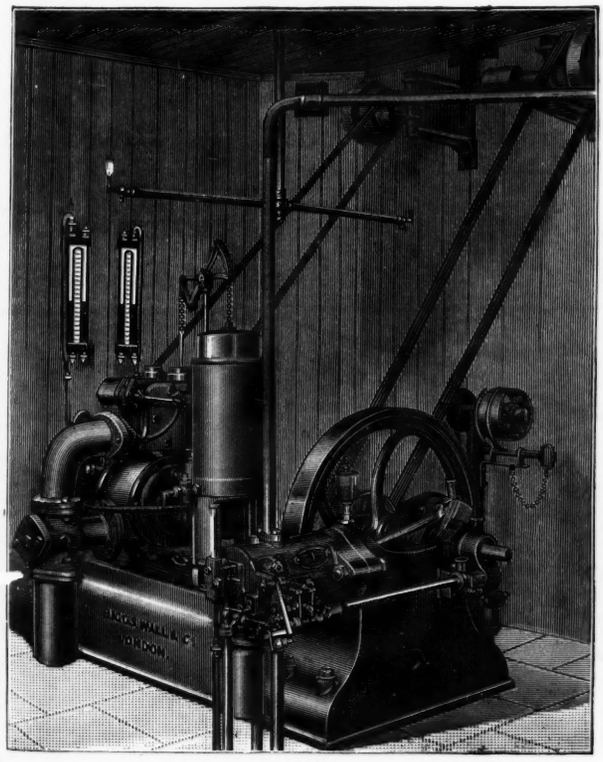

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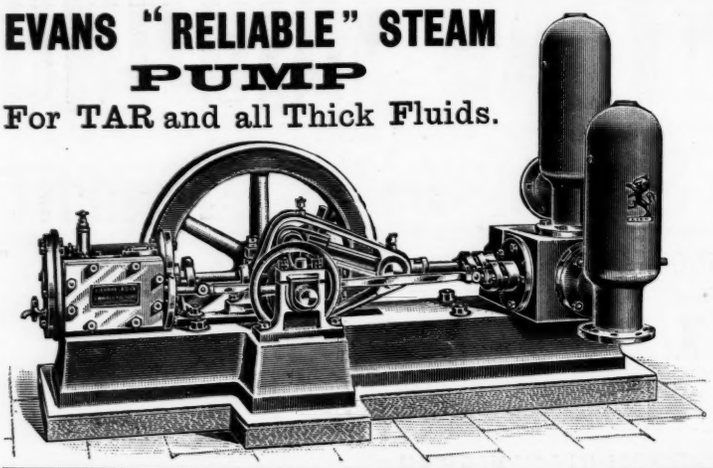

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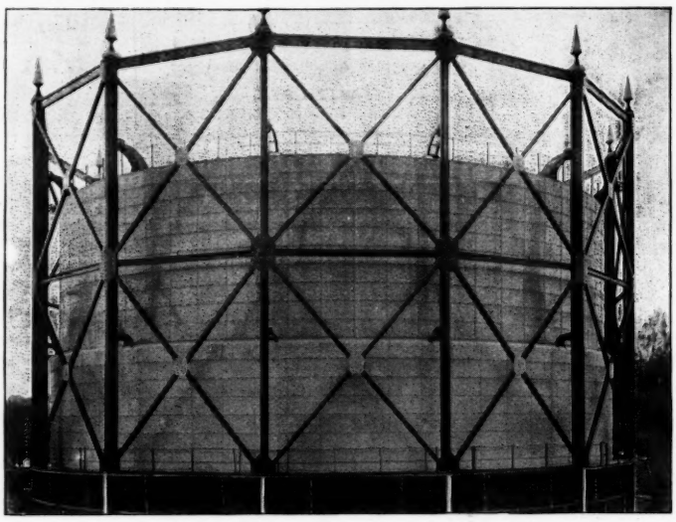

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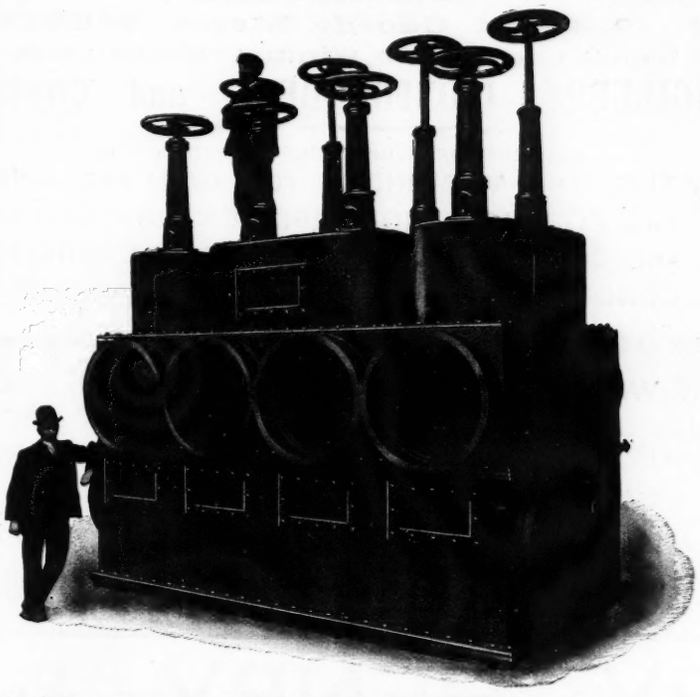

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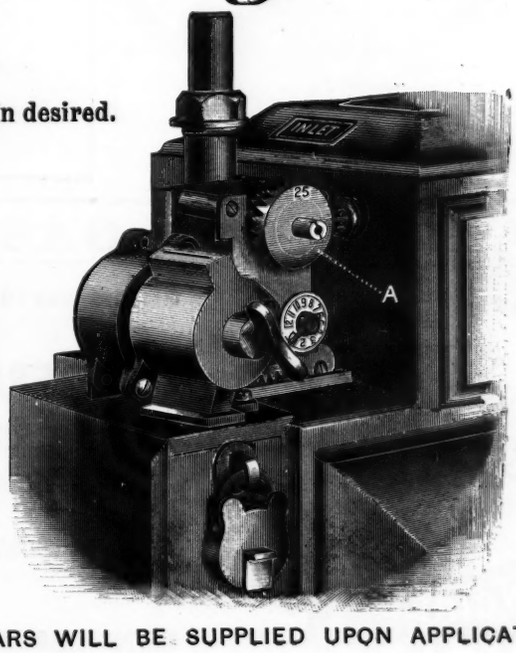

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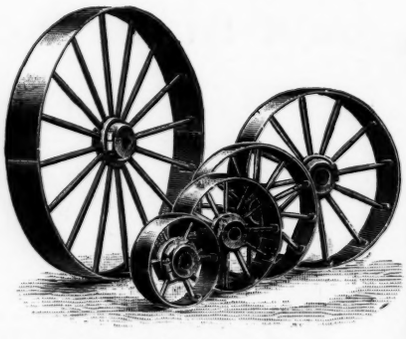

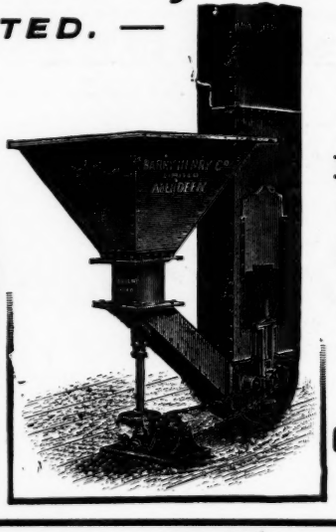

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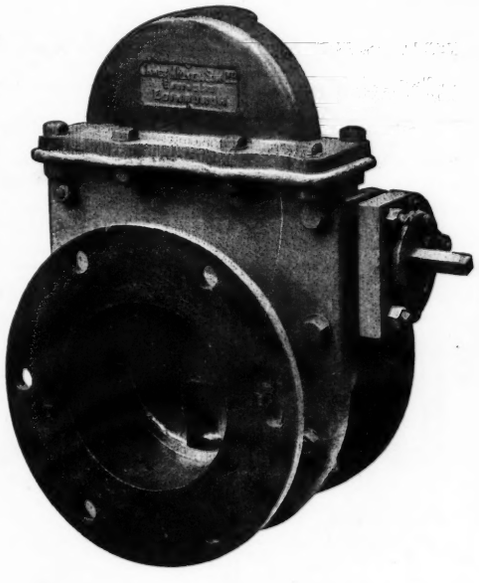

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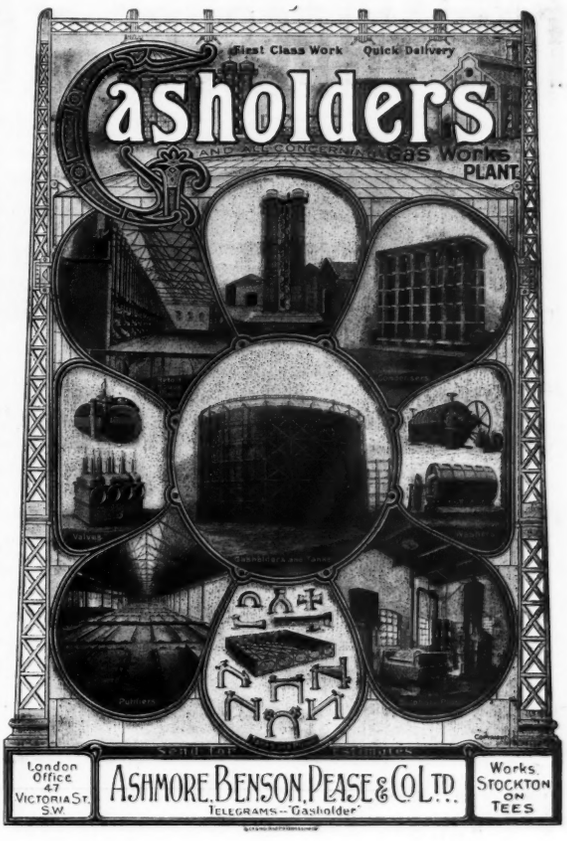

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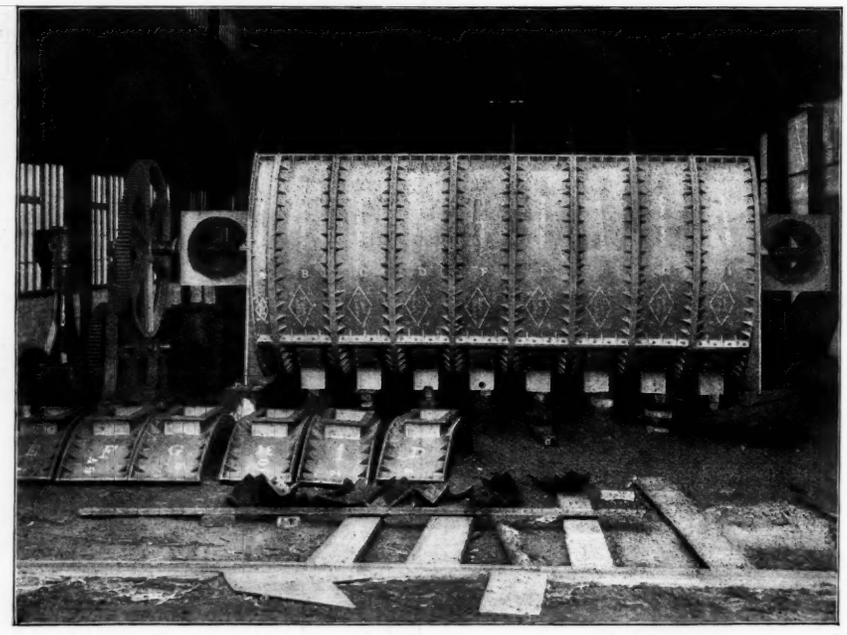

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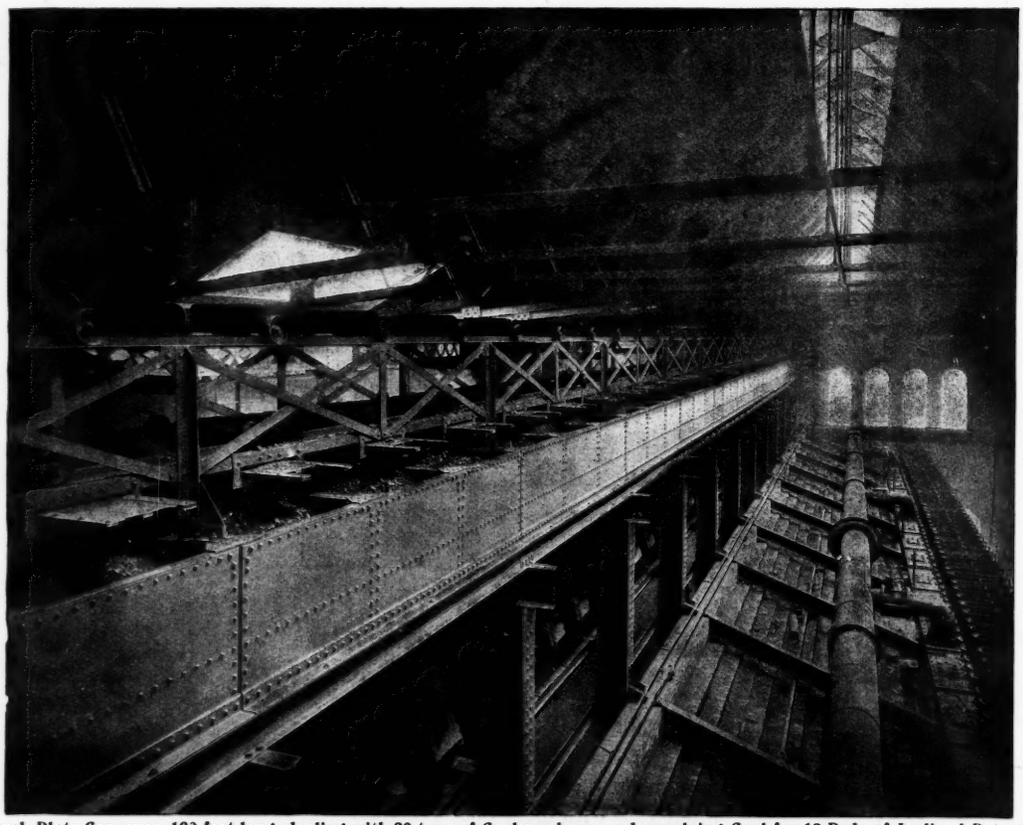

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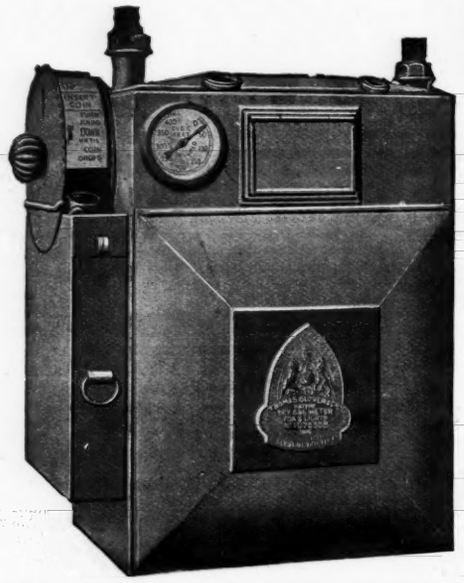

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. XCI., No. 2206.—TUESDAY, AUGUST 22, 1905.

EDITORIAL NOTES—GAS, &c.

Retention of Power Supply by Gas Undertakings.

A VERY determined movement has set in making for the retention on the part of gas undertakings of the business of power supply, and its greater cultivation. By this fact, the observant reader and student of current gas events must have had his mind arrested ere this. It has hardly been possible during the past few months to pick up a single issue of the "JOURNAL" without having the subject brought to notice, if not always by special articles, by the announcement that this or that Board of Directors or Gas Committee has resolved to reduce the price for power purposes. It cannot be denied that the action that is now being taken is somewhat belated. The producer gas people have long since been assiduously working their way into the field, with results more or less successful; and the electricians have, with every new electricity undertaking that has been opened, been making a bold bid for the business, and again we may say with more or less of success. Electricity (so long as nothing goes wrong with the supply and the mechanism) has its advantages, in the matter of space, cleanliness, and handiness, in manufacture and industry; but we have the assurance of authorities and power customers that, even with the small concessions secured from gas suppliers in times past, economy is on the side of gas. But as we have pointed out before, the more serious competitors are the producer gas plants, and particularly the modern addition to the *genus*—the suction type of plant.

Though those in charge of gas undertakings, with but few exceptions, were somewhat slow in grasping the fundamental principle that a sharp attack from any quarter must be met by equally sharp resistance, the last few months have produced a remarkable change, and the tactics adopted are not only of an order that are defensive but they are offensive. Gas undertakings are putting themselves not only in a position to defend the business that they at present have in power supply, but are contending for fresh business on the price basis with those plants that cannot compete with them in equality in the matter of convenience, and in the entire removal from the manufacturer of all capital, maintenance, and labour costs, and the additional anxiety, attention, and responsibility that any new introduction into his manufacturing operations must entail. Of course, in every gas undertaking, in this connection, two questions have to be considered by the management—"What is the lowest "cost above the expense of manufacture per 1000 cubic feet "[not below it as the electricians sometimes put it] at which "we can afford to supply gas for power purposes to add to "the consumption in the summer and in the daytime when a "large part of the capital is to a certain extent lying idle?" and "What is the highest price at which we can supply to "keep competitors out of this line of business?" The latter question embodies the way that Mr. Dugald Clerk, Mr. J. H. Brown, of Nottingham, and others have surveyed the position. The great authority of the gas-engine industry has placed the highest price at 1s. 6d.; and Mr. Brown and his Committee, before Mr. Clerk voiced his view, sickened the producer gas people at Nottingham by determining on the same figure. Of course, illuminating power is a great factor in resolving what is the lowest possible price; and progress in illuminating power does not necessarily mean a *pro ratâ* progress in calorific power. But the illuminating power has to be taken into account in fixing the price for power purposes; and therefore the higher it is, the worse for the gas manufacturer in his competition for the power business. The 1s. 6d. must not be taken as being definitive; but it is, where the conditions are suitable, undoubtedly a good goal to aim for. Some have exceeded it—Widnes, for example, are down to 1s. for power purposes; Sheffield, to 1s. 2d.; and West Bromwich have a scale ranging between 1s. 5d. to 2s. Widnes and Sheffield are, of course, exceptional cases. Then at the 1s. 6d. price, we have Nottingham, Leicester, Lancaster (1s. 6d. to 1s. 11d.), and Plymouth. Darlington and St. Helens are at 1s. 8d.; and Glasgow, Bury, and Derby at 1s. 9d. (the last-named with a scale from 1s. 9d. up to 2s.). Birmingham is at 1s. 10d., less 5 per cent.; and the Commercial Gas Company and Stafford, at 2s. Hereford and Dunfermline are at 2s. 3d.; Reading at 2s. 6d.; and Longton has just made a reduction of 3d. for power purposes. These are particulars that have been gathered by only a hasty glance through recent issues of the "JOURNAL;" and in the reference for information, it has been observed that special prices also obtain in Bristol, Manchester, Newcastle, Rotherham, Stockport, South Shields, Stoke-upon-Trent, Stourbridge, Walsall, and Wigan. Of course, it is not suggested that this exhausts the list of undertakings that are taking pronounced steps in the campaign for the retention of the power business and for opening up new ground and recovering that which has been lost. There are many others; and we shall be glad to hear from engineers who have succeeded in persuading their Boards or Committees to adopt special prices for power supply, with information as to the prices, the illuminating power, and, if possible, the average calorific power of the gas supplied.

Old and well-cherished notions which in the past have been ardently defended, and have appeared to be firmly established, have often to fall before inconstancies arising in other directions with the flight of time. A flat rate for gas supply for all purposes no longer holds good. With the incandescent gas-burner, we can maintain our position with a flat rate for lighting; and the same rate will hold the field of cooking and heating, for in that gas has no competitor in the matter of economy, owing to its convenience, cleanliness, saving of labour, and reliability. To cooking and heating consumers, concessions may be possible in the matter of the lightening of rents and the expenses of fixing; but a differential price for gas for these purposes—in these days when stoves have obtained such a large unexpected adoption—would be out of the question where duplication of meters has not been resorted to from the outset, owing to the capital involved in providing separate meters, the cost of the labour in fixing, the annual capital charges, the duplication of items in accounts, and the extra inspection and clerical work. All this expense could be better devoted to making an all round reduction. Of course, there are cases of specially large consumers for cooking and heating where it would pay to make a concession in price. We also know that there are cases where concessions are made for cooking and heating, and the proportion estimated. But that is a loose way of doing business; and no doubt often leads to disagreement. It is anyway a system one would hesitate to recommend.

But the question of power supply is altogether a different matter. Time, through the competition from new sources, has nearly, if not quite, destroyed, throughout the industry, the doctrine of equality of price for gas, no matter the purpose or importance of the consumer; and in the power customer, we have a considerable consumer worthy of our special consideration in this respect. There is no use blinking the fact that the competitors for power are not only at the door but well inside it; and between them and gas the struggle will be severe. But the question of price will turn the balance of the favour of the manufacturer, who must be the sole arbiter. Mark this! To-day is not the time to lose the business; and in fixing the price to-day, there must be some thought of the future. All that is done now even to the point, if need be, at which gas can be sold without loss coming on the undertaking, is to assure the power business for the future. The struggle with the competitors must be now; for the gas industry has set its face towards the production of a cheaper grade of illuminating gas. That is a condition that must come; and no one can stop what is inevitable. A slip or default at the present time will prove a regret in many cases in the future, when gas of lower illuminating quality is being made.

We are glad to see so many undertakings have lately taken up this question, and made such substantial reductions for power purposes; thus putting themselves in a position from which competitors will have a difficult (we hope impossible) task to dislodge them. No one outside

can suggest to an undertaking, owing to the variation in several conditions, what is its highest competing price; but it is interesting to see how 1s. 6d. is the point towards which gas undertakings are drifting. In using this and other low prices as weapons in the competition, the other attributes of a town gas supply—convenience, reliability, and the relief of the manufacturer from financial and labour responsibilities, and space requirements—are advantages to be utilized as having a value beyond the price of the gas.

Consumption Increases and Works Provision—An Electricity Agreement.

THE Tottenham and Edmonton Gas Company have now for some years past had a conspicuous record of development; and the tale of progress which Mr. Corbet Woodall has to tell half year by half year will, if there is not an alteration (and there is no sign of it), become dull, through reiteration, to any not financially interested in the Company. Those responsible for the management cannot help this; nor have they any care in regard to it, seeing that the subject is one that the proprietors themselves find compatible with their tastes. While other companies are talking of lower rates of increase through mild weather and light days, the Tottenham Company come out with no less than an 8 per cent. increase in consumption, a 10 per cent. advance in ordinary meters, 27 per cent. in prepayment consumers, and 20 per cent. in stoves. These figures represent the expansion of business last half year. Of course, the Company experienced, for the same reason that other Companies did, a reduction of the rate of augmentation of consumption as compared with the first half of 1904, when the increase was 17 per cent. But the refusal of the business to show the slightest pause does not, and will not until the completion of the present scheme of works rearrangement and development, allow the consumers and proprietors to enjoy to the full the rewards of the prosperity, and of the industry of the management—directorial and official.

Thus a wealth of prosperity such as this has its temporary disadvantages. But they are disadvantages that all can look on with complacency, knowing that every half year the time is drawing nearer when the Company will have got so far ahead of possible requirements that there will be a period of rest from unusually heavy capital expenditure and abnormal charges against revenue for replacements. During the past few years, money has been flowing in a constant stream into the capital account; and the additional sums required for dividend and interest have had to be, and have been, satisfied. The extraordinary accretions of business that came upon the Company necessitated extraordinary steps being taken on the existing works site to keep pace with it; and this has caused the Directors to dip deeply, but not unfairly, into revenue for renewals. After the current year, however, this charge will be a diminishing one, and eventually it will get down to something like normal condition, as even modernizing work must for a period come to an end. Then there will be very good ground (other conditions being propitious) for anticipating an early reduction in price for the consumers, and this will also carry advantage to the proprietors. Of course, with such increases, new producing works are still in progress; for it is necessary to keep the works well abreast of the possible needs of the district. Upon this point Mr. Woodall uttered a warning which we would propagate beyond the Tottenham proprietary. It applies chiefly to those undertakings which have had fat years of increase; and it is that they must not be lulled into any sense of security in the matter of productive margin by the succession of mild winters that we have had. To such, with considerable increase upon increase in consumers and their requirements, an unusually severe winter would now bring an unprecedented demand; and it is for this that preparation must be made. The Tottenham Company at all events are not going to be found napping, either in the immediate future or thereafter. Practically, terms are already settled for the purchase of additional land adjoining the present works; and capital powers being on the point of exhaustion, the Directors are going to Parliament to obtain further authority in this respect, and to secure approval to the new land being utilized for manufacturing purposes. The near future is being provided for on the present site; and it is clear that at no distant date there will be supplementary works springing up on the new one.

There are some other points in the proceedings at the meeting which will be found of interest; not the least the announcement of the Chairman that the Tottenham District Council have entered into an agreement with the Metropolitan Electric Power Supply Company for a transfer of their electric lighting powers, subject to the approval of the Board of Trade. It will be interesting to see whether this is a case that comes within the scope of the Sudbury decision, in which the Board of Trade declined their sanction to a transfer. If the cases are not identical, and the agreement is concluded, the ratepayers will have the one satisfaction of knowing that they will not have the risks of an electricity business upon their shoulders, but they will have to bear—whether they like it or not—the extravagance of installing and maintaining at least 110 electric lamps in the streets, of an average consumption of 600 watts. This, with the prices per unit named in the agreement, is sufficient to assure us that the expense of lighting the thoroughfares in which those lamps will be placed will greatly exceed the cost of the present incandescent gas-lamps, as well as of much else that the Gas Company could do to enhance the illuminating power if the need demanded. The electric lighting of the main thoroughfares to the extent named is one of the conditions of transfer; and the contract is to be for ten years. The agreement is altogether one-sided; and in it the Council come off second-best. Of this, they will without doubt have painful proof if the Board of Trade suffer it to proceed.

Commercial Gas Company—Percentage Increases and Other Matters.

THE proceedings at the half-yearly meeting of the proprietors of the Commercial Gas Company last Thursday were so much a reflection of what transpired at the meetings of the other two Metropolitan Companies that there is little in the results of the working of the half year, or in the address of the Chairman (Mr. W. G. Bradshaw), to which special attention can be directed. But arising out of the latter, there are two or three matters upon which comment may be made. Leading up to the first one: In this Company, the mildness of the winter months of the half year, a reduction in price, and the greatly weakened condition of the coke market, all told in producing two results—only ½ per cent. increase in the consumption of gas, and a falling off of net profit to the extent of £4716. The outcome was that the net profit of the half year was deficient of the amount required to pay the dividend by £3231—£800 more being demanded by the dividend for new issues of stock.

It is the ½ per cent. increase that suggests remark. The question has occasionally occurred to us, and more especially since the large Metropolitan Gas Companies have been showing smaller percentage increases than of old, whether there is really any good purpose served in the case of these Companies by making comparisons by percentages at all. The volume of gas consumption is so vast that even 1 per cent. increase in the total would represent an annual gas consumption of no mean order for many a Provincial gas undertaking; whereas some of the Suburban and Provincial undertakings whose consumptions are not a tenth or a twentieth of any one of the Metropolitan Companies' output, and even smaller still, can (though their volume of increase may be insignificant in comparison) on their lower amount of business superficially show—reckoning the increases on the percentage basis—a healthier condition of things than "those great London Gas Companies," even with like adverse atmospherical conditions influencing. Another thing which for the time being is in many cases making a striking difference to certain of the Suburban Companies' percentage increases, as compared with those of the London Companies—is that the character of the residential population of London is largely changing, and the migration to the suburbs, through the improvement of travelling facilities, is going on apace year by year. The result is that, in every district of London, there are to be found a considerable number of "empties." The old residents go further afield for the modern class of house; and as their houses are filled up again, it is by a different kind of tenant, whose gas consumption is often on an inferior scale to that of the previous occupier. In many cases, too, the old London houses are being converted into flats and lodging-houses; and the prepayment gas consumer then largely comes in. This increasing transformation of the residential population must have its effect, but we do not suggest to the detriment of

the Gas Companies in the long run, though it would doubtless have been so if lighting had continued the sole business of the Companies. Cooking, heating, and power supplies have wrought remarkable recuperative changes; and under the roof where an ordinary meter formerly existed, there frequently are now found two or three of the prepayment type. All this, however, at the cost of capital. Take two figures from Mr. Bradshaw's address—the one, that the new ordinary consumers in the half year only numbered 193, and the other that the new coin-meter consumers numbered 4393—and ask whether they do not portray this change taking the eastern district only, in the residential character of London. Then, again, as bearing upon the general question of increase on all sides, the three Metropolitan Companies have right up to their outer supply boundaries the Suburban Companies, so that they do not to any considerable extent now profit by any new building development such as the Suburban Companies are at present enjoying. These are matters that should all be borne in mind when considering the question of relative stability and prosperity as marked by such an unsafe standard as percentages. Withal the London Companies are showing excellent increases in business, as disclosed by the new connections of all the various means of utilizing gas; and it is from this standpoint, from the gross figures of consumption, and from revenue balances, rather than by mere consumption percentages, that the progress of the London Companies ought now to be compared and judged. From one remark made by Mr. Bradshaw in the course of his speech, we think he will be in agreement with this.

Altogether the address of the Chairman was an encouraging one so far as the business outlook is concerned; and this remark—the mutation in character of the residential population notwithstanding—can be applied to the other Companies. The brighter, too, is the outlook since the removal of the rigour of restriction imposed by multiplex authority. In this connection, Mr. Bradshaw completed the reciprocal acknowledgment by the heads of the three Companies of the good that has ensued from acting in unity in the recent great parliamentary struggle. Those interested, however, will not avoid noticing that he (speaking on behalf of his Board) pointed out that—while they are not satisfied with the fixed rate of consumption as the best method of burning the gas in testing, because it involves the use of a separate burner for different qualities of gas—it is their opinion that the Companies have had substantial justice done them. With this, all are agreed; but the Companies set out with a certain end in view, and there is only one more step to be taken to compass that end. Yet it is rather significant that the Commercial Chairman trusts that for many years yet to come expensive parliamentary proceedings will not again be necessary. We may be mistaken in the meaning it is intended shall be placed on the latter words. If we are not, then all that can be said is that it would be a great pity, in view of the admission as to dissatisfaction, if the onslaught on the final objectionable point were not made with the strength that comes of unity.

There were two subjects upon which the Chairman spoke with regret. One was the inevitable question of rates; and here he made the striking announcement that, of the total assessable value of Poplar, Bromley, and Bow, considerably more than half is in respect of the property of companies who have no vote or voice in the management of local affairs. Such a state of things cannot go on for ever; but justice is a long while coming. The other matter to which Mr. Bradshaw alluded with regret had regard to the bonus scheme. In every way but one has profit-sharing fulfilled expectations; and the exception is that the men have not followed the lead of the South Metropolitan and South Suburban employees, and left the withdrawable half of the bonus with the Company. Of course, no one can inhibit the men withdrawing the half, as, by so doing, they are keeping strictly within the rules which they on their part and the Company on theirs agreed to abide by when the scheme was first accepted. Having said this, we must also express regret that the excellent example of their southern comrades is not being followed by the Commercial men; for though the withdrawable half is part of the scheme and agreement, it is something more. It is the test of each man's sincerity in carrying out to the utmost the aim and purpose of the scheme. The man who leaves the withdrawable half to his credit in the safe keeping of the Company is the man who fully appreciates the scheme, and the man who desires to fully profit by it hereafter. He is wise and thrifty, and a man that has our respect. The matter is one that the Chairman, the Directors (including Mr. H. E. Jones), and the officers have very much at heart; and they are going to try the effect of a little personal suasion on the men. We hope that the coming conferences will have a good result. This was one of the difficulties that Sir George Livesey had to contend with on the South side of the river. It required perseverance; but the men there have, with few exceptions, shown that they were open to reason. As they find their holdings and accounts with the Companies increasing, they are glad to think that they were not so foolish as to turn a deaf ear to the exhortations of their "guide, philosopher, and friend." We have no doubt the Commercial men will show themselves equally intelligent, and unwilling to continue to disappoint their Directors and officers.

A Record Low Price for Gas at Liverpool.

Mr. H. Wade Deacon, the successor to Sir Edward Lawrence in the chairmanship of the Liverpool Gas Company, was able to make the gratifying statement at the meeting last week that the price is to be reduced by 2d. (to 2s. 6d.) per 1000 cubic feet for gas of 20 candles statutory power—which constitutes a record for the city in the direction of cheapness. It is easy to understand the Chairman's regret that it did not fall to Sir Edward's lot to make the announcement; but in spite of his retirement from the head of the Company, the good work done by him during the many years that he occupied the chair is not likely to be forgotten. It was Sir Edward Lawrence's desire to see the price of gas down to 2s. 6d.; and there can be no doubt that his able administration of the affairs of the undertaking has been largely responsible for this goal having been reached. The sale of gas in the city during the past year shows a trifling diminution of something under $\frac{1}{2}$ per cent., and, like others, the Company have suffered from the state of the residuals market; while, on the other hand, rates and taxes display that aptitude for rising to which unfortunately we are getting nowadays quite accustomed. It is well that the Chairman should emphasize the fact that, of the price paid by the consumers for their gas, no less than $1\frac{3}{4}$d. per 1000 cubic feet is handed over in the shape of rates and taxes. Mr. Deacon appears to have resigned himself to this burden, which he truly says is a matter over which the Company have no control, and with regard to which they can scarcely expect any reduction in the future. But the present level of rates is not the worst that is to be feared. Things are bad enough as they are; but, unless some drastic steps are promptly taken to put an end to the money-spending fever from which such a large number of local authorities are just now suffering, there can be little doubt that a very much more serious state of affairs is in store for ratepayers. Once the money is spent—be it in "remunerative" or "unremunerative" works—it is useless to complain; the only possible hope lies in preventing its expenditure, and to accomplish even the smallest amount of good in this direction there is (pending the intervention of Parliament) only one course open to the largest ratepayers—*i.e.*, the voteless public companies. This course is ceaseless agitation. It is interesting to note that the Directors of the Liverpool Gas Company are gathering information which is likely to be of assistance to them in forming a judgment on the question of the respective merits of high and low power gas; and that they have instituted a series of experiments to satisfy themselves as to the relation existing between the price of gas of various candle powers and the value which the consumer secures in the light he obtains by burning it. This is an important investigation for both shareholders and consumers, for the decision that may be come to cannot fail to have an influence upon the future business of the undertaking.

More Successful Profit-Sharing.

It is always a pleasure to draw attention to schemes of profit-sharing in actual operation, as we are convinced that in this direction is to be found one of the best means of fostering that good feeling between employers and employed which is essential to the permanent banishment of the harmful industrial disputes that are of far too common occurrence under the old-fashioned order of things. A judicious system of profit-sharing, however, accomplishes even more than the cultivation of friendly relations

between master and man—it yields a good return on the monetary outlay, in the shape of an increased interest on the part of employees in their work. This, at any rate, has been the experience of the several gas companies who have adopted the system; and therefore it seems somewhat strange that the idea has not "caught on" more rapidly than it has done. The principle involved in profit-sharing is, of course, the same in all manufacturing industries; and if it answers in one direction, there appears no valid reason why it should not in another. We are therefore pleased to note the success that has attended the introduction of a scheme among their workpeople by Messrs. John Knight and Sons, Limited, the soap manufacturers. On the recommendation of the Managing Directors, it was arranged that a division of profits beyond a fair percentage as return on capital should be made. The latter was fixed at 6 per cent.; and as a result of the year's trading, the whole of the Company's employees and staff, clerks and travellers alike, are to receive three weeks' extra wages as their share of the profit. In both respects referred to earlier in this paragraph the scheme is stated to have been successful—employers and employed are working together hand in hand to carry on the business in the best possible manner, and the savings made have fully justified the distribution of the bonus, which will increase according to the prosperity of the Company. The Company are to be congratulated therefore upon the step they have taken; and we are glad to see that the scheme does not end with the payment of the bonus, inasmuch as an opportunity is offered by the firm for investing the money. This should encourage thrift, and enable the men to derive the fullest possible advantage from the profit-sharing system.

The Municipal Shop.

A little incident showing how economy in the management of public affairs is simply despised by some councillors comes from Derby. With some amount of pride, certain newspapers have promulgated the intelligence that the Council have voted £256 for completing and fitting up the Market Hall for electric lighting; and these same papers did not forget to add that the cost of an installation of intensified incandescent gas lighting would have been £42 more than the cost of the installation of electric arcs. The tender for the latter was submitted by the Corporation's own Electric Lighting Department; the tender for the intensified gas lighting installation by a trading firm of high repute in this class of work. Under the circumstances, there need be no surprise that the Electricity Committee's tender was lower than that of the firm in question. But the whole story was not told by our electrical friends. By spending the additional £42 on the gas installation, it was stated at the Council meeting that the cost per annum for lighting by gas would have been some £70 less. In other words, the saving of £42 in installation is going to cost the Corporation £70 a year more! This puts another complexion on this acceptance of the tender of the Corporation Department. If the Gas Company had offered to light the market for one-half the cost of the electric light, this incident leaves no room for doubt that the Council contain in its membership a sufficiency of non-economists to have ensured the lighting even then going to their own shop.

Parliamentary Estimates and Actual Cost.

A remark made by an Inspector of the Local Government Board, who was conducting an inquiry at Torquay last week respecting the expenditure on a new reservoir which the Corporation of the town are constructing, draws attention once more to the extraordinary manner in which some engineering estimates are exceeded. Such cases are, indeed, so common that it is the rule rather than the exception to find the expenditure on public works considerably larger than was anticipated when parliamentary powers were applied for. The frequency of these examples, and the large amount of extra outlay in many instances, go far to justify the allegations of the Inspector that estimates are deliberately whittled down in order to get schemes through. Indeed, the Consulting Engineer of this Torquay scheme went so far as to admit that, when it was prepared for Parliament, he drew attention to what he calls the "hopeful view" which had been taken with regard to the execution of certain parts of the work. It must have been evident then, as it is now, that insufficient margin was being allowed for ordinary contingencies, and that—altogether apart from such unforeseen, though not unprecedented, difficulties as have arisen in finding a water-tight basis for the dam, and the necessity of purchasing additional land—it was highly improbable that the work would be executed for the sum put down in the Bill. There can be little doubt that, in this case at least, the estimate was cut down to the lowest figure with a view to mollify the opponents of the scheme. It is, however, short-sighted policy. What it will probably mean for the ratepayers of Torquay is that they will be called upon to repay this excess of expenditure in thirty years instead of the sixty years allowed for the original loan. This is the penalty which the Local Government Board are threatening to impose on the neighbouring town of Paignton, which is in a precisely similar difficulty over the same cause. The Paignton water-works are estimated to cost £111,000, or 60 per cent. more than the original estimate; while the Torquay reservoir will cost £39,500, or 80 per cent. more. After every allowance is made for unexpected difficulties, it is impossible to avoid the conclusion that too much latitude is allowed by the Engineers' "hopefulness," when that comes no nearer the mark than this.

Companies and the Franchise.

A report presented to the Westminster City Council emphasizes once more the injustice to joint-stock companies by their exclusion from the rights of the franchise. Approximately the total amount of rates paid in the city during last year was £1,846,177. Of this, occupiers represent 50·70 per cent.; Government property and properties of the city and other local authorities, 10·35 per cent.; and the remaining 39 per cent. is from non-voters, of whom joint-stock companies represent 26·40 per cent. Westminster, of course, is in a peculiar position in being the centre of parliamentary and official life; but the figures show that only just over half the rates there come from voters—contributors of the remainder having no vote. This is a condition of things that cannot surely be justified. The Lord Chancellor the other day was attacking this question at the United Club; and in pointing out that there is no appeal against the rates, and that people are obliged to pay what the rating authority impose upon them, he mentioned that at Swindon the Great Western Railway Company pay seven-eighths of the rates, and yet have not a single vote. Could such a system be endured, he asked? When the Lord Chancellor speaks in this way, we hope that the proper answer is in the negative, and that joint-stock companies will not have to endure the injustice much longer.

WATER AFFAIRS.

Revival of an Ancient Scare.

THE story is told of a certain Scotch editor who, when at a loss for a subject for a "leader," used to give instructions for one of his staff to have a fling at Dr. Chalmers; not that the worthy divine had just at that time done anything to call for a special attack upon him, but because generally he was regarded as a "bad lot." This appears to be the attitude assumed by our contemporary the "Lancet" towards the chief source of the water supply of the Metropolis—the River Thames. The advent of warm weather, and possibly the absence of topics, seem to engender an irresistible desire to cause a scare among the population by condemning the water they drink as being, at its best, nothing more than "diluted sewage," when a low death-rate and the absence of anything like an epidemic producible by foul water are fairly good proofs of its innocuousness. While bringing this "grave indictment" against Thames water, our contemporary is candid enough to acknowledge that the evidence that the water supply of London has been accountable for disease is "not convincing." We admit that a stream into which sewage is discharged is not, as the "Lancet" says, an "ideal source of water supply," if the water is drawn at a point close to, or even near, the spot where the discharge takes place. It would not only not be "ideal," it would be absolutely unfit for use. But what effect has the discharge of sewage into the Thames down at the Nore on the water flowing above Teddington Lock? Very little, we venture to think. Of course, sewage does find its way into the river in its upper reaches; but, thanks to the vigilance of

the Thames Conservancy, the quantity is now decreasing year by year. We are not defending the conversion of the Thames into a sewage carrier or into a receptacle for any other filth; and we would prosecute all who caused its pollution, even though the offenders were the Metropolitan Water Board itself. What we submit is that the effect of what does find its way into the stream is not so harmful as alarmists try to make out. Just as we believe in the *vis medicatrix naturæ*, so do we in the self-purification of rivers. The Lake of Geneva, at the point where the Rhone enters it, would probably not be regarded by the purists of the "Lancet" as being an "ideal source of water supply." Yet the water at the other end of the lake is so good that it can be supplied to the inhabitants without purification.

The object of this fresh attack on the Thames appears to be a desire to arouse public interest once more in a scheme for bringing to the Metropolis a supply of water from Wales. The Metropolitan Water Board have actually been in possession of the undertakings of the Water Companies for fourteen months, and they have not shown any signs of going to Parliament to obtain sanction to the carrying out of such a scheme, possibly on the lines of that now lying among the archives at Spring Gardens! It seems to us that they are doing something very much more reasonable, and far more to the ultimate advantage of both consumers and ratepayers. The "Lancet" pointed out that London water drinkers are now "at the mercy of the filter-beds." Well, the Water Board are quite aware of the importance of efficient filtration; and at their last meeting loans were sanctioned for carrying out large extensions of the filter-beds and reservoirs. The storage works not long ago completed at Staines, as well as those carried out by the East London Water Company, have proved to be valuable auxiliaries. As it is necessary at times to take in flood water, adequate provision is needed for storing it. This has been afforded by the works mentioned; and it must be borne in mind that those at Staines are only the first instalment of a large project for the construction of storage reservoirs in the Thames Valley.

It will thus be seen that the Water Board are desirous of utilizing all the available resources at hand before incurring an enormous outlay in bringing water to the Metropolis from a distant part of the kingdom. Londoners have nothing to complain of on the score of quantity, as the last returns show that they have at their disposal 34½ gallons per head daily. This is not, perhaps, the "ideal" quantity, which would allow every man, woman, and child to have a bath; but it is not inadequate, nor is it costly. It would be, if it were, as some would have the consumers believe, "diluted sewage." But when they have the testimony of Sir William Crookes, Sir James Dewar, and Dr. Thorpe (the Government Analyst), that the water supplied to London is, on the whole, of good quality, we think they may safely rest satisfied, and decline to be alarmed by exaggerated statements. To the testimony of the eminent Chemists named may be added that of Sir Edward Fry, the President of the Court of Arbitration under the Metropolis Water Act, 1902, who declared that, for the purposes of the award of the Court, the water of both the Thames and the Lea must be taken as "capable of being supplied in excellent condi-" tion for domestic purposes." Should the population increase at such a rate as to render the present sources of water inadequate to supply it (of which increase, by the way, there appears to be some doubt), then recourse must be had to a distant watershed.

Purification of River Water by Ozone.—The ozone plant in West Philadelphia is now in operation, and tests of its work in water purification have been made by Messrs. Rivas, Jackson, and Hale. Raw Schuylkill River water contains as many as 2,500,000 bacteria per cubic centimetre. After rough straining, this number is reduced to 250,000 to 700,000; and after the ozone treatment to 5 to 55. These few are all of harmless varieties, and the water is also deodorized and freed from colour. The process is substantially as follows: An electric current is taken from the city wires to operate a motor generator, producing a current of 100 alternations, which is raised by transformers and condensers to a voltage of 10,000. The current passes as a pencil of blue light from each of some millions of metallic discharge-points across a short air-gap to nickel receivers. Atmospheric air is drawn across this gap by means of an air-pump, and in so passing is partially converted into ozone. The ozonized air is then forced through a stand-pipe, in which it meets a current of water flowing in the opposite direction. The bacteria are instantly destroyed.

MUNICIPAL ADMINISTRATION AND ITS PROFITS.

MUNICIPAL administration is on its trial. Some might say that it is a trial. From all directions there come complaints of extravagance in expenditure, the reckless piling up of debt, and increasing rates. It is not in London alone the burden is felt. Rates are going up all round. The small towns seem no more successful than the great ones in the practice of economy. It is the large towns, no doubt, which are mainly responsible. They set the pace; and the smaller places, one after another, follow along the road to ruin. A convenience enjoyed by the big city is found to be needed in the neighbouring town. If the one has a palatial town hall or art gallery, the other must have its town hall or art gallery, on the best imitation of palatial lines that it can raise. So with tramways, electric lighting, and all the other luxuries to which the municipalities treat themselves. Following the example which has been set them, the small towns are burdening themselves with debt for supposed necessities, some of which are not necessary, and all of which, if they were needed, could be more advantageously supplied by private enterprise than at the public expense.

Of course, there is something to be said on the other side; and at a time when municipalities are being widely criticized, it is interesting to see what they have to say in their defence. An address which was delivered before the Institute of Municipal Treasurers and Accountants by the President, Mr. W. Gunner, the Borough Accountant of Croydon, may be taken as an authoritative pronouncement on the subject. Mr. Gunner is an advocate of municipal trading; and in addressing the Institute of Municipal Treasurers and Accountants, he was preaching to the converted. It is significant, therefore, to find him declaring at the outset that the question of the increase of rates is the foremost topic of municipal interest, and warning his hearers that only works of necessity should now be undertaken. "Local circumstances," he says, are responsible for the excessive rates prevailing in many towns; and it is to these that we must look when we would understand how it is that in one town the rates amount to no more than 4s. 4d. in the pound while in another they are as much as 10s. 1d. The term, though sufficiently comprehensive, does not go far to explain why rates have generally advanced and are still advancing. When he comes to particulars, Mr. Gunner enumerates as among the causes of higher local taxation the increased cost of education —undoubtedly a very serious burden in some towns—"additional sanitary requirements such as baths and hospitals, as well as provision for the intellect, such as libraries, museums, &c." These things, we are told, have now become necessities, and have to be provided. As against their cost, Mr. Gunner puts to the credit side of the account the reduced death rate; and when he strikes a balance, he finds that "what on the face of it appears a financial loss, is in reality a direct pecuniary advantage to all classes of the people, and a national asset of enormous importance."

Mr. Gunner might have strengthened his case by including among the sanitary measures two things which are at once the most important from the point of view of public health and the most costly—namely, the provision of abundant supplies of pure water and of efficient systems of drainage and refuse disposal. No one finds fault with municipal authorities for spending money on these purely sanitary requirements; nor can any great exception be taken to the prudent expenditure of money on baths, which are more or less self-supporting, or parks and open spaces in crowded districts. What Mr. Gunner describes as "provision for the intellect" comes, perhaps, in a more doubtful category. Both free libraries and museums have an educational value if they are rightly used; but they are hardly to be placed in the same list of necessaries as the sanitary provisions with which they are classed by Mr. Gunner. It is indeed questionable whether the community ought to be taxed for the provision of lounging places for idle people such as free reading rooms and museums have a tendency to become, and for the supply of light reading to those whose intellect is nourished on novels. However, the libraries and museums, like the parks, do not count for much in the sum-total of the rates; and if they are not put to the best advantage it is possibly the fault of the management and of the need of education in those for whose benefit they are provided.

In other passages in his address, Mr. Gunner touched on more controversial subjects. For example, he claims that the increase of the rates throughout the country is due in the main to increased duties and responsibilities placed upon the authorities by statutes passed during the past few years. Our opinion is rather that it is due to the ambition of the municipal authorities and their usurpation of the field of industrial enterprise, for which, by their constitution, they are ill-equipped. Parliament, it is true, has imposed upon municipalities some new duties, particularly in regard to education; but many of the responsibilities —ranging from music halls to milk shops—which add to the ratepayers' burdens, have been voluntarily assumed by the corporations. If Parliament is to be blamed, it must be because it has weakly permitted these things, and not for having enforced them. When Mr. Gunner comes to the subject of municipal debt, he is astonished at the moderation which the authorities have displayed. Having regard to the important and onerous duties which, as he contends, the Legislature has imposed, and to the

increased amount which has been provided for what he describes as "works of municipal necessities," he finds it "distinctly creditable" to the municipal authorities that they have not exceeded the margin of borrowing powers, which was limited by the Public Health Act, 1875, to twice the rateable value of their areas.

No one would willingly seek to deprive any municipalities of any credit which is really due to them; but Mr. Gunner's praise seems in this instance a little overdone. Why is it distinctly creditable to the corporations that they have fulfilled a statutory obligation? If they have not borrowed for sanitary purposes more than the Public Health Act allows, the reason is very obvious. On the other hand, to say that the debts of the municipalities do not exceed twice the rateable value is distinctly misleading. Since 1875, the municipal debts of England and Wales have increased from £92,000,000 to over £350,000,000; while the rateable value of the property has only risen from £115,000,000 to over £174,000,000. The fact is that not only has municipal indebtedness overtaken and passed the limit which Parliament applied to a portion of it, but it is going at a rate which, as compared with the increase of rateable value, causes misgivings even among those who are not hostile to wisely directed municipal enterprise. Lord Welby, with all his sympathy with the work of the London County Council, was the other day shaking his head over the prospects of municipal bankruptcy, and pleading that drastic powers should be given to the Local Government Board to prohibit municipal borrowing after it had reached a proportion equal to two or two-and-a-half years' rateable value.

Although indebtedness was increasing and rates rapidly advancing, Mr. Gunner is bold enough to challenge those who are so "impractical" as to object to these things. Municipal debt is, he says, in many cases on the same footing as the capital of companies; and it is no more reasonable to object to one than to the other. "It is beyond the area of dispute," he tells us, that the supply of water, light, and traction "should not be in the hands of monopolists;" and, of course, if they are to be run in the public interest there must be municipal capital to run them. This argument ignores the important fact that there is a great difference between the obligations which the shareholders in a company voluntarily assume and those which are imposed on ratepayers. Though the money may be put to practically the same purpose, there is a vast difference between capital of a company voluntarily subscribed and loans for which the whole community is made responsible either with or against its will.

While regarding it as "beyond dispute" that municipal authorities should engage in certain forms of trading, Mr. Gunner points to the profits which municipal undertakings yield, and says that in no less than 70 boroughs these have been the means of reducing rates. We have a shrewd suspicion that in very many of these cases the reduction of the rates is not apparent to the ratepayers. Municipal profits are, indeed, a delusion, and, where they are made, come for the most part from the pockets of the ratepayers themselves. How they are made was rather cruelly exposed at the same meeting of the Municipal Treasurers and Accountants by Mr. C. E. Moon, who fills the office of Borough Accountant of Hampstead. Mr. Moon was discussing the question of electric light accounts, and explaining how they should be kept. On the subject of street lighting he was particularly clear and outspoken. Taking it as "granted that the cost per candle power of electric light is less than that of gas"—a large and unwarranted assumption, by the way—Mr. Moon proceeds to say "there is no doubt, however, that the cost per mile of street lighted (with electricity) is much greater as compared with gas; and the result of adopting arc lamps to any large extent must inevitably lead to an increase in the rate levied for public lighting." That the local authorities are aware of this seems conclusive from the fact, which Mr. Moon also points out, that "in the majority of districts where the council possesses the electric light undertaking the proportion which the supply for street lighting bears to the total units sold is very much greater than where companies are the undertakers." The returns show that in London the municipal owned undertakings are supplying for public lighting from 50 to 15 per cent. of their total output, while no company has in a lighting authority a customer for more than 14 per cent. of its output—the majority supplying much less, and nine companies do no public lighting at all. Nor is this all. "Another significant fact," says Mr. Moon, "is that the average price paid to companies for supply to the street lamps is only 2·01d. per unit; while where the councils supply the current the average charge is 2·36d., or more than ¼d. higher.

Lest the significance of these facts should be lost, Mr. Moon urges that the figures should be borne in mind by borough accountants, so that, in advising their committees on the financial aspect of their undertakings, care may be exercised that "money shall not be taken from the rates in this manner to swell profits." Mr. Moon, who has experience of municipal management, thinks that such a thing would not be done intentionally; "but where two interests are in conflict, a committee may unconsciously become biased in its judgment." Where it is a case of bolstering up an electric light undertaking and making profit, we think it is not unlikely that the bias will be found in active operation, whether consciously or unconsciously. Mr. Moon, at all events, seems to have been unconscious of the fact that, in describing the result of his analysis of the electric light returns, he was giving away the whole case for municipal trading. It is not easy to have faith in the reality of the profit of municipal trading in face of this admission of one of its advocates, that "profit" is made by selling to the ratepayers something which they do not want, at a price considerably higher than a company would have supplied it at if it had been required. The ratepayer does not get much out of municipal trading, either of profit or indirect benefit, when it operates in this way; and it is experience such as this which makes us hesitate to subscribe to Mr. Gunner's confident assertion that the municipal supply of water, light, and traction is so advantageous as not to be questioned.

ELECTRIC LIGHTING MEMORANDA.

Ratepayers and Municipal Electricity Financial Methods—Reserve and Depreciation Funds the Ratepayers' Protection—Points from Glasgow, Wolverhampton, and St. Pancras—An Electrical Contemporary's Invitation—Fires and Regulations—Competition, and the Vitality of the Gas Industry.

He is a callous critic who can never find anything good about a competitor or rival, or systems the general principles of which do not command his approbation or respect. Municipal accounts are the subject of the attack of many writers and orators; and we have occasionally ranked ourselves with those who think that such accounts are not always what they should be, both in their manner of keeping and in the system of obtaining on trading undertakings a "profit," real or otherwise, and the allocation of the profit when obtained. But there are municipalities and accounts that are exceptions. However, in connection with several municipal electricity supply undertakings, the ratepayer is a much-abused person. The electricity undertaking has not the same claim upon him as the provision of, for example, libraries, open spaces, and baths, without mentioning the absolute common necessities of a community. Nevertheless, the ratepayer is made in most cases to pay an inordinately fat account for street lighting from which he gets little enjoyment or material advantage; and then, after paying the heavy tax for the luxury of allowing the electricity department to light the streets, if the receipts of the undertaking are not enough to pay expenses and capital charges, down on the defenceless ratepayer swoop the department again with a demand for further pecuniary aid, instead of carrying on their trading on ordinary business principles, and making ends meet through their patrons. When "profits" are made, the vogue is to deal with them in a way that, if the ratepayers would only wake up to the fact, they would find was to their ultimate disadvantage, seeing that, through funds not being conserved, they have no assurance that further financial aid will not be required of them. Reserve and depreciation funds are things that are not general; and in most cases where they have existence, their amounts have somewhat melancholy proportions when placed in juxtaposition to the capital expenditure. But, though electrical station engineers and their committees know what they should emulate in method even if they cannot do so in degree, there are among them those who sink doing what is right in order that they may float on a little passing swell of popularity. In the provision of reserve and depreciation funds of adequate amount, town councillors and ratepayers must see, if endowed with ordinary intelligence, that there is protection for all concerned.

Of course, all towns are not Glasgows; but if there is one city or town whose Electricity Department must possess all the cardinal virtues, it is that of Glasgow. In their working, they obtain good results, the accounts supply a model for perspicuity, and the manner of disposing of the gross profit is one which is almost universally applauded. Correct financial principles are certainly in being here. Among the general trading expenditure is found a sum of no less than £41,841 for depreciation. The balance on the revenue account is £69,934; and this is disposed of as follows: Interest, £38,182; sinking fund, £15,475; and reserve fund, £12,723. The balance is only £3554; and this, with a surplus of £10,341 from the previous year's working, has been applied not to the relief of the rates, but to balance a deficit of £13,895 on the 1902-3 accounts. Notwithstanding the largeness of the amount set aside for depreciation, it is pointed out by the "Electrician" that it represents 3·7 per cent. on the capital expenditure at the beginning of the year, allowing for the amounts already deducted for depreciation up to May 31, 1904. It also represents 0·55d. per unit sold. This is bad for the unit; but the percentage on capital expenditure, there are financial and electrical experts who will be prepared to say, is still inadequate. However that may be, the Glasgow Corporation Electricity Department in their financial system are a brilliant example. Occasionally it is observed that, when a would-be prudent, but weak-spirited, Electric Lighting Committee are in office, correct financial system collapses before the entreaties of councillors for "something" for the ratepayers. The Electricity Committee of the Wolverhampton Corporation, although not so proportionately prosperous as Glasgow, are trying to do the right thing, but not so completely as the great northern city—funds, as commonly the case, not permitting. But we are glad to see the Chairman and his Committee refuse to fall into the popularity snare so beautifully spread for them. At a recent meeting, the Committee announced their intention of transferring the net profit of £3400 on the past year's working to the previously accumulated reserve fund, making it £10,022; and there was some amount of eloquence expended in showing the

Chairman how he might easily become the popular idol of Wolverhampton by disposing of the sum in lightening the rates to that extent. If this is all that is to be gained by depleting the funds of the undertaking, then there is a safer plan (which will give less anxiety in the future) for attaining the same end, and that is the continuance of wise administration. In the accounts of the Electricity Department of the St. Pancras Borough Council, we have an example of a Committee who are trying to steer a middle course, by putting something to reserve, and at the same time handing over a sum for the ratepayers. Their accounts are among those that are used by electricians with indurated consciences for showing the minor governing authorities of the country how prosperous a thing is the electricity business. From the last accounts, the Borough Council have transferred £10,000 to the reserve fund, and £3000 to the relief of the rates, which latter had better have been applied to reserve or to depreciation, seeing that the total capital expenditure up to 1904 was £484,138, and the net profit last year was only £13,860, against £20,583 the previous year. The illustrations suffice to show what to do, as well as the necessity for Electricity Committees animated by prudence showing a stiff back to the temptation to impair the strength of their undertakings (when profits are obtained) for a temporary spell of popularity. The price paid is far too big.

There is a sanguine little paragraph in the meteoric notes in the "Electrical Times" of the 10th inst., in which the writer comments on the small percentage shrinkage in gas consumption in the Gaslight and Coke Company's district in the past half year, tells half the tale as to the causes of the decrease, boasts of the success in providing light that the electricity suppliers have not yet achieved among the middle class, suggests that the lower strata of consumer will presently be silly enough to be "educated up" to the use of electricity and so spend their earnings extravagantly, and winds up by asking a gas contemporary to reconcile the statement of the Governor (Sir William Makins), at the recent meeting, that the Gaslight Company had to reduce the price, otherwise many customers would have given up the use of gas, with the legend on the top of the Company's bills: "Price of gas 2s. 11d. per 1000 cubic feet, equal to electricity at ½d. per unit." "Meteor" admits that, 1904 being leap-year, this accounts for part of the comparative decrease in consumption in the past half year; but he does not take into consideration the fact that the steady substitution of incandescent burners for flat-flame burners is what is really checking the advance of consumption. The only other part of the paragraph that is worth noticing is that as to reconciling the statement by Sir William Makins and the assertion at the top of the Company's bills. Why a gas contemporary should be made responsible for what Sir William chooses to say, be asked to give an interpretation of his words, and try to adjust them with another statement that the Company make, affords something in the nature of a psychological problem. But, as we are busy just now, perhaps "Meteor" will explain what was on his mind when he thought his journalistic contemporaries were the proper people to whom to refer the matter. However, if we understand what Sir William was driving at, there is no necessity to attempt any reconciliation of the statements but rather their justification. "Meteor" knows full well the influence among consumers of a reduction in price, however small; that consumers are oftener led to judge of the dearness or otherwise of a commodity by its price for a given quantity than by the capacity of that quantity to render service or fulfil a certain purpose. If consumers were in the habit of judging by the latter method instead of by the former, then the Gaslight and Coke Company would have had a smaller number pass over to the purveyors of electricity in London; and therefore the latter have something to be thankful for that there are consumers who judge by price rather than by result. There is no doubt, too, that the Governor's remark as to the reduction applies rather to large users of gas for power and as a heating agent in trade processes (where steam, producer gas, and coke are competitors as well) than to users of gas for lighting. For the Company, it is well known, have been having a steady return of tradesmen who, having tried electricity, have found it wanting in economy. The Governor mentioned in his address the gas lighting of the new Victoria Station of the Brighton Railway; but "Meteor" does not. Perhaps "Meteor" will inquire as to the prices at which the Railway Company were offered electric lighting for the station. He will probably find out something that will make him pursue his inquiries in order to ascertain how it was that, with beautifully fine-cut figures for electricity, gas lighting still won the day. Now as to the "legend:" "Price of gas 2s. 11d. per 1000 cubic feet equal to electricity at ½d. per unit." It only requires a little elementary calculation to justify it. It is well established that, with "C" incandescent gas-burners of various makes, from 18 up to (say) 23 candles per cubic foot of gas consumed can be obtained. Therefore, with "C" incandescent gas-burners and 1000 cubic feet of gas approximately 20,000 candles can be realized. According to an article in the "Electrical Review" for the 11th inst. (p. 207), it will, we think, be fair to base the electrical computation on 4 watts per candle power. 20,000 candle power at 4 watts per candle power equals 80 units. 80 units at ½d. equals 3s. 4d.; and 1000 cubic feet of gas in the Gaslight Company's district costs 2s. 11d. There does not appear from this to be anything amiss with the legend. Moreover, between the 3s. 4d. and the 2s. 11d., there is a good margin to cover the difference between the cost of renewal of lamps and of mantles. And the day of ½d. per unit electricity for lighting is yet afar off!

We are forced to the conclusion that, in the past, there has been a good deal of insincere talk and writing on the subject of electricity and fires in electrical circles. Of course, according to electricians, there is nothing more certain than electricity for preventing fires; but between whiles we get, by way of supplement to reports of electrically produced fires, such a mass of rules and regulations bearing on installations in this or that place, that we cannot at all harmonize them with the character of docility and harmlessness that is so frequently imputed to electricity. Indeed, we wonder how electricians manage to keep even approximately straight in the course they should take in the matter of installations. However, either they must be wrong as to their estimate of the inoffensiveness of electricity or all the rules and regulations must be unnecessary. And time after time we are strengthened in the belief that the former is the truth. We have been reading the rules that have just been issued for wiring the stands at the Electrical Exhibition which is to be held at Olympia this year. There are a dozen of these rules; and the question naturally arises, Why are any necessary? As they are read, the conclusion is early formed that, without their strict observance, the promoters are rather apprehensive of something going wrong; and the conclusion is abundantly ratified by the note of warning at the end: "It is of the highest importance that no fire or alarm from any cause whatever should prejudice the public against the application of electricity. The Committee rely on the intelligent co-operation of all exhibitors in the observance of these elementary regulations, which are drafted in the best interest of the industry." We shall continue to hold our own opinion on the subject of the fire-raising capacity of electricity.

It is decidedly interesting to observe how it sometimes happens that a new commodity, or a fresh method of accomplishing a definite purpose or a certain end, makes progress and yet does not result in all those ill-effects upon those prior commodities and methods that may have been anticipated. In the last report of His Majesty's Consul at Milan is mentioned the progress that has been made in Lombardy in utilizing water power to generate electric current, and in transmitting it over considerable distances for lighting, and as a motive power for industrial purposes. It is stated that the distribution of this energy has been devoted to supplying new industries and replacing steam-engines. In the district worked by the Società Lombarda, nearly 12,000-horse power out of 20,000-horse power provided by steam has been supplanted. At one place, too, where 500-horse power by steam-engines was formerly used, 1000-horse power by electric motor is now employed. But though the abandonment of steam has demanded a smaller use of coal for steam raising, and though water power has replaced coal so largely in producing the motive force, yet the importation of coal in Italy has risen from 4,426,524 tons in 1898, to 5,904,578 tons in 1904. From what the Consul says, it is evident that a decline in, instead of an augmentation of, coal importation was expected, and expected through the favour shown to the water-power generated electricity. Why it should have been anticipated that there would have been a traceable effect in these totals is not quite clear, seeing that Lombardy is not Italy, and that in Italy the gas industry has not been standing still, and a great deal more coal than ever before is now required for gas production. But a better illustration of the words with which this paragraph starts is found in the competition of electricity with gas. All that electricity gains in power business, of course cannot be booked as a loss by gas; but a considerable part of the gain of electricity in lighting undoubtedly is, though what electricity is getting now is more by good luck than merit in regard to cheapness. While electricity has deprived gas of business, the very article—the incandescent burner—with which the gas has been beating back the competition and breaking fresh ground has also represented to the extent of its adoption a loss of consumption equal to—taking the figure given by Sir George Livesey at the recent meeting of the South Suburban Gas Company, as a fairly acceptable standard—37 per cent. Now when electricians consider this vast dual cutting into gas consumption, they must admit that—it being difficult to find an occasional gas undertaking that does not still consistently show an increase in business—the gas industry exhibits wondrous vitality. The prognostications of a now far-off day, as to electricity driving gas from the field as an illuminant, have been decently and discreetly buried by electricians among those things that it is best for their peace of mind should not be remembered, or if remembered spoken of only in secret.

Recovery of Products in Coke Manufacture.—Dr. C. Otto has taken out a French patent for the recovery of bye-products from coal in the manufacture of coke. The process consists in conveying all the products of distillation, including the ammoniacal liquor, to a point where the temperature of the gas has been lowered to 70° or 80° C., or below the boiling-point of water, and then reversing their course. The reflux-pipe has an inclined position. The hot gases cause renewed evaporation of the light hydrocarbons and ammonia from the condensed tar; and condensation takes place according to the temperature of the returning gases. The quantity of water and oil required for the extraction of ammonia and benzol from the outflowing gas is very small; and a highly concentrated ammoniacal liquor can be obtained.

NOTES FROM A CONSULAR REPORT.

Coal Tar, the Tar-Colour Industry, and other Topics from Germany.

Diplomatic and consular reports are not sources to which one would naturally turn for light reading; but all who trade in the markets of the world would find in those coming from our representatives in the countries which are our principal competitors, much information of incalculable value. The asserted neglect of these reports in the British industrial world is the proof of the want of appreciation of their value, or of the lethargy of our manufacturers. It is true that the reports are not, as a rule, so comprehensive as could be desired; but at the same time they are generally found to contain matter which should be of interest and helpful to all engaged in commerce. It is general knowledge that the intellect of Germany, and what is termed that "happy combination" of science and practice, are, and have been, devoted unremittingly to the making of headway in the industries and to the shutting out to as great an extent as possible of foreign competition. On the latter point, in public tendering, for example, it is now often expressly stated that German trade will be exclusively considered; while even in "open" tendering, by the wording of which a foreigner (from the German point of view) is not excluded *ab initio*, he is, as a rule, handicapped by the conditions of the tender and by tariffs. There are exceptional successes, as we know; but they are few and far between.

On these and numerous kindred matters, the lately issued annual report of Mr. Consul-General Francis Oppenheimer, on the "Trade and Commerce of Germany," is particularly instructive; but they are matters of a too general nature for lengthy consideration in columns devoted only to special topics. In dealing with the subject of syndication in industry and trade just recently, we referred to some illuminating statements in this report; and there are in it a few other points to which attention may be directed, though there is plenty of temptation to travel beyond them. In the first place, there are a number of statistics which show generally how greatly the exports of Germany are progressing in the matter of manufactured articles. The absence of complete specification, however, does not enable us to draw from the figures information directly bearing upon manufactures required by the gas industry. But it is observed, in the table of general imports and exports for 1904, that the quantity of coal, coke, &c., imported was 156,991,040 met. centners; and exported 216,869,255 met. centners. (A "met. centner" equals 220 lbs.) Of tar, pitch, resin, asphaltum 2,518,000 met. centners were imported, and 1,157,962 met. centners exported. The value of the coal, &c., imported increased from 162,274,000 marks in 1903 to 170,070,000 marks in 1904; and the exports from 287,983,000 to 297,916,000 marks. But there was some reduction in the value of tar, pitch, &c., imported, from 45,343,000 to 44,228,000 marks; while the value of the exports under this head stood about level—13,516,000 marks, in 1903, and 13,841,000 marks in 1904. In the next table are figures of more immediate interest; showing the imports from the United Kingdom, but the latest figures are for 1903. In that year, the coal, coke, &c., imported reached the highest figure—5,405,859,000 kilos—to which it had attained since 1900, when it was 6,199,168,800 kilos. The imports of tar, pitch, and asphaltum have been on the decline since 1900, in which year they amounted to 85,267,600 kilos., as compared with 65,425,800 kilos. in 1903. But whereas the coal, coke, &c., imports in 1900 were valued at 116,870,000 marks, and in 1903 at 76,836,000 marks, the smaller quantity of tar and pitch in 1903 was valued at 9,472,000 marks, as against 7,757,000 marks in 1900. This is worth nothing. In the table of exports to the United Kingdom, there are no entries under coal or tar.

In passing, it is observed that in the German glass trade there has been considerable development; and one item in the table which is particularly large is attributed to the demand for electric glow lamps, the exports of which alone were of the value of 3,700,000 marks in 1903. It is rather peculiar that it is only in dealing with Austria-Hungary that any mention is found of the importation of sulphate of ammonia; and the business with that country in this respect has grown considerably since 1892. In that year, the value of the importations of this commodity from Austria-Hungary was only 769,000 marks; in 1900, 1,439,000 marks; and in 1903, 2,694,000 marks. Extended consideration is given to the great Rhenish-Westphalian Coal Syndicate by Mr. Oppenheimer; and it is clearly shown by him how syndication leads to syndication. The establishment of a selling bureau in connection with the Syndicate has brought great hardship upon a large number of coal dealers; and most of those who were drawn into the net find their incomes have been considerably reduced below what they had been led to expect by the promoters. Apparently, the Syndicate are quite convinced of the lasting preference of the public for Westphalian coal, as the price has been fixed "at a figure which has caused general indignation." This, of course, should have been expected; for a high price is the preordained result of all such combinations. The great strike of miners in the Westphalian field is naturally a matter that presents varied aspects, upon which the Consul-General expands; and towards the end he quotes an estimate of the total loss incurred by the strike—viz., some 90 million marks. The opportunity presented, it appears, was taken in order to get rid of large stocks of coke; and throughout the strike, British among other foreign coal was offered at high prices, and these during the early period were secured. But later shipments are said to have resulted in great losses. As a matter of fact, the Syndicate production of coal in 1904 having exceeded sales, the stock of native coal was sufficiently large to meet immediate wants. This is the secret of the stubborn resistance the coalowners were able to offer to the demands of the miners. As will be remembered, the strike was brought to an end by a promise, on the part of the Government, that the miners' demands should be officially examined, and that a Bill should be laid on the table of the House abolishing the worse grievances. A general coal strike, whatever the reserves may be, must affect the industry of a country; and, in this instance, there was ample evidence that the Syndicate—though the men had good ground for certain of their grievances, and carried public sympathy largely with them—had such control over the situation, that they could prolong the strike, and obstinately refuse to negotiate, to the general detriment of industry.

In the chemical industry of Germany, combination is also going on; and important amalgamations have been effected—especially among the concerns that produce aniline dyes. This is all the more noteworthy as at least four of the firms represented (so to speak) "great powers" in the tar-colour industry. This set of combinations, Mr. Oppenheimer says, was undoubtedly prompted by a certain anxiety that the past profits could not be easily maintained in future under the old system. But he suggests that concentration, and the consequent massing together of capital, is possibly more justifiable in the chemical industry than in any other; for not only are great sums expended in research, but, when new discoveries have been made, further capital sums are required to bring the new invention within reach of the consumers. The combinations ranged the five most important works into two groups; but already speculation is rife, and a General German Chemical Trust is spoken of. This is by no means an impossibility; for the chemical industry of Germany commands the market of the world. Here science, technique, and enterprise have, independently of the customs duty, achieved a success elsewhere unequalled. But will it still continue to do so by the massing together of interests, and effacing to such large extent the hitherto important element of individuality in scientific research and in management? And what of the consumer? Will he fare better or worse? Under the old separate existence, four out of the five aniline dye concerns in question earned, according to the report under notice, average dividends in 1901 of 20·85 per cent.; in 1902, of 22·03 per cent.; in 1903, of 22·62 per cent. This does not look as though, as the Consul-General suggests, there was any need for disquietude as to the maintenance of past profits. During the decade 1888 to 1898, the average dividend of the chemical dye industry was 21·4 per cent.; and, furthermore, the exports of aniline dye matter rose from 107,251 met. centners in 1892 to 293,362 met. centners in 1903. The value rose from 50,550,000 to 88,010,000 marks; but, following the increased production, the price per met. centner during the period sank from 490 to 300 marks. As just shown, however, the dividends have only been favourably affected.

These are a few points from a consular report interesting to those concerned in the sale and purchase of coal tar and its derivatives, and incidentally other manufactures. The notes are also sufficient to show the great development that is taking place in the syndication of the industries of Germany, and not, it would appear, to the general advantage of the people.

CONCILIATION IN LABOUR DISPUTES.

In last week's "Journal" some statistics were given regarding the labour disputes of the past year, from the seventeenth annual report on strikes and lock-outs in the United Kingdom, prepared by Mr. A. Wilson Fox, of the Labour Department of the Board of Trade; but the portion of the report dealing with the settlement of disagreements by conciliation and arbitration was not then touched upon. We therefore return to the subject now, for the purpose of briefly noticing some of the more important points of the report in connection with this interesting aspect of the labour question. Of course, the principal agencies for conciliation and arbitration are mainly concerned with the prevention rather than with the settlement of strikes and lock-outs. During the year 1904, the various Boards of Conciliation and Arbitration are known to have settled 615 cases; while most of the actual stoppages were settled by the parties themselves or their representatives.

Of the 354 disputes in 1904 which involved a stoppage of work, 27 (involving directly and indirectly 7455 workpeople, or 8·6 per cent. of the total for all disputes) were brought to a close by conciliation—that is, by the mediation of a third party or Board—or by reference to arbitration. The number of disputes so settled differed but little from the previous two years; but the number of workpeople affected was considerably less. Of the total of 7455 persons engaged in disputes which were settled in the manner named, 3873, or 52 per cent., were in the coal-mining industry; and it is worthy of note that during the past five years there has been greater resort to conciliatory agencies for settling troubles in the mining and quarrying industry than in any other trade. Of the 158 disputes, affecting 74,473 workpeople, which began during the period referred to and have been settled by conciliation or arbitration, 44 (affecting 19,651

persons) were in this particular industry. A table which accompanies the report shows that, out of the total number of disputes of the year involving a stoppage of work, twelve were arranged by conciliation and fifteen by arbitration.

Turning to the work of the permanent Boards of Conciliation and Arbitration, it is stated that the total number of cases known to have been considered by 62 permanent Boards in 1904 was 1418, as compared with 1633 cases considered by 73 Boards the previous year. Of last year's cases, 748 were reported to have been withdrawn, referred back, or settled independently of the Boards; and 55 as still under consideration at the end of the year. The remaining 615 cases were settled, as to 400 by the various Boards or Committees, and as to 215 by Arbitrators or Umpires appointed by them. The cases dealt with varied greatly in importance. One settled by the Conciliation Board for the Coal Trade of the Federated Districts of England and Wales affected 230,000 workpeople, and the reductions in wages arranged by the Coal Trade Board for the County of Durham concerned 107,500 persons; while, on the other hand, the 295 cases settled by the Durham Joint Committees affected in most instances very few workpeople. The Conciliation Boards in the coal trade who control the general level of wages are, it is pointed out, entirely distinct from the local Joint Committees, who are concerned with questions arising at individual pits. The Northumberland and Durham Joint Committees contributed between them 366 cases, or more than one-half of the total number known to have been settled by permanent Conciliation Boards. The number of Boards who have settled cases during the past five years, so far as they are known to the Labour Department of the Board of Trade, is as follows: 1900, 64; 1901, 54; 1902, 57; 1903, 62; and 1904, 54. During the past year, five Conciliation Boards or Joint Committees were formed, one which had lapsed was revived, three ceased to exist, and one, while still existing, suspended operations.

The figures quoted in the report are sufficient to show that the work now being done hy the Conciliation and Arbitration Boards is of an important character; and it must be the earnest hope of all true friends of labour that, as time goes on, this method of settling industrial disputes will become more and more popular.

OBITUARY.

At the half-yearly meeting of the Barnstaple Water Company on Monday last week, reference was made to the death of Mr. Edward Dennis, who had been a Director of the Company for 26 years, for 24 of which he had been Chairman. He was elected to the office at a time when the works were not altogether in an efficient state; and it was due to his initiative that this condition of things was altered.

We regret to announce the death last Thursday, after a long and trying illness, of Mr. Andrew Dougall, who for 27 years held the position of Engineer and Superintendent of the Hull station of the British Gaslight Company, which he relinquished in October, 1901. During his tenure of the office, he effected great changes in the works. When he first took charge of them, they were turning out 250 million cubic feet of gas per annum; when he handed them over to his successor (Mr. John Young, of Norwich), the make was 1200 millions. At the meeting of the Company in September, 1901, reference was made by the Chairman (Mr. J. Horsley Palmer) to the loss they were about to sustain by the resignation of their "very able Engineer and Manager at Hull," who had come to them from Kidderminster, and whose 27 years of hard work for the Company had, he was sorry to say, told upon his health in a large measure. He added that the Directors had given Mr. Dougall what he deserved, in every sense of the word—a good pension, which they hoped he would live long to enjoy. A few weeks later, Mr. Dougall was presented by the officers and workmen with a service of silver plate, as a mark of the esteem and respect in which he was held by them, and in recognition of the unvarying courtesy, kindness, and consideration he had shown to all who had come in contact with him. Mr. Dougall, as our readers are aware, has several sons in the gas profession; the eldest—Mr. Andrew Dougall, M.Inst.C.E.—being the Engineer and General Manager of the Tunbridge Wells Gas Company, and a Past-President of the Institution of Gas Engineers, which body, as the British Association of Gas Managers, his late respected father joined in 1871.

Many members of the gas profession will, we are sure, share the regret with which we announce the rather sudden death of Mr. J. W. Russell Wall, of the firm of Messrs. Biggs, Wall, and Co. Mr. Wall was in his office on Wednesday, the 9th inst., but went home at midday, feeling unwell. Pleurisy and subsequently pneumonia set in, and he passed away last Tuesday afternoon, at his residence, Raglan Villa, Parkhurst Road, New Southgate. Mr. Wall began his business career in the office of Messrs. Harris, Scarfe, and Co., Australian Merchants, of Gresham House, but left them in 1882 to take the position of commercial traveller to Messrs. R. Laidlaw and Sons, under Mr. William Wall, sen., who was then their London representative. He left the service of the firm, in 1892, and threw all his energies into the business which his father had founded under the style of Messrs. Biggs, Wall, and Co.; and when Mr. William Wall retired from active work in 1900, Mr. Russell Wall became the chief acting partner. In addition to the wise counsels of his father, he had the able assistance in the business of his brothers, Mr. Cromwell Wall, Mr. A. Howard Wall, and Mr. Wilberforce Wall, who will carry on the work of the firm as in the past. Mr. Russell Wall was an extraordinary member of the Irish Association of Gas Managers; and it will be seen by the report of last Tuesday's meeting, which appears elsewhere, that feeling reference was made by the President (Mr. G. Airth) to the loss the Association had sustained, and a telegram couched in sympathetic terms was sent to the friends of the deceased. Mr. Wall was always kind and considerate to his employees, and courteous and obliging to everyone; while his manly and true Christian spirit inspired the confidence and esteem of all who knew him. The funeral took place on Saturday, at the Great Northern Cemetery, New Southgate. Mr. Wall was in his 42nd year, and he leaves a widow and family.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 514.)

The general attitude of the markets on the Stock Exchange are far better than might have been forecast. In settlement week in the quiet holiday time, and with a closed Saturday, one might fairly have expected very dull markets and drooping prices. But it was not so; there was a moderately good amount of fresh business, and prices rose perceptibly. There was at times a little ebb after a rise; but on the whole (though here and there dulness prevailed, as in the Kaffir Market) there was a fair improvement in values. Two elevating factors were cheap money and a persistent belief (perhaps not altogether uninspired by manufactured rumours) that the Peace Conference would agree terms. In the Money Market, there were the usual seasonable demands; but the supply was ample to meet them—abundantly so towards the close, when a large sum of Japanese money came in. Discount rates ruled firm until the latter event, and then showed an easier tendency. Business in the Gas Market shows signs of holiday reduction, but there was no one day upon which it really approached stagnation. The tendency was favourable all round; and a large number of quotations which underwent *ex div.* adjustment profited fractionally by the alteration of the figures. Several others rose, too, without the enforced change. In Gaslight and Coke issues, the ordinary was only moderately active, but at steady figures. The *cum div.* prices ranged from 101½ to 102¼, and the *ex div.* prices from 99½ to 100. Of the secured issues, the maximum was done at 92½ *cum div.*, and 90½ and 91 *ex div.*; and the preference at 112½ *cum div.* and 111 *ex div.*—the latter showing an advance of a point. The debenture changed hands at 87¾ and 88¼. South Metropolitan was quiet and firm. Prices *cum div.* were from 132 to 133½, and *ex div.* 130¼ to 131. The debenture marked from 89 to 89½. In Commercials, the 4 per cent. was done once at 118⅞, and the 3½ per cent. once at 113½. The debenture rose a point after a small lot had been done free at 85½. Very little business was transacted in the Suburban and Provincial group, although many issues improved in their quotations. British marked 41¼, with an advance; and on their local Exchanges Liverpool "B" and Newcastle debenture advanced. A little quiet business was effected in the Continental Companies. Imperial changed hands at from 212 to 213½; Union advanced a point without business done; and European fully-paid marked 22⅜. Among the undertakings of the remoter world, Monte Video marked 11⅝, Buenos Ayres 12 7/16, River Plate 12¾, Primitiva ordinary 6 and 6¼, ditto preference 5¼, and ditto debenture 97⅞. Hong Kong was done at 18 15/16.

The closing prices are shown in our Stock and Share List on page 514.

The New River Company's Bonus Distribution.—In their "City Notes" yesterday, the "Pall Mall Gazette" said: Mr. B. L. Cohen, M.P., just as Parliament was breaking up, endeavoured to lodge a question regarding the bonuses to be distributed by the New River Company, and particularly with regard to £2500, of £5000 so set aside, which the Arbitration Court had handed over to the Metropolitan Water Board. The bonuses in respect of the other Water Companies were a full half-year's salary in the case of the Southwark and Vauxhall, and three months' salary in the cases of six of the others. The £2500 referred back to the New River Company has now been distributed; the late Secretary (who recently retired on a large pension from the Water Board, and also a retainer of 500 guineas a year) receiving £1250, and sundry officials the remainder. The small range of the distribution has caused great dissatisfaction among the old staff—the collectors, for instance, who recently memorialized the Board, and who worked very hard to realize outstanding assets, getting nothing at all. As the New River Company still exists as the New River Company, Limited, to control the large landed estate which they retained at the time of the transfer of the water undertaking to the public authority, it is hoped by the old employees that they may yet see their way clear to suitably acknowledge the services of those of their officers who helped to build up for them their great business and large profits.

LABORATORY EXAMINATION OF GAS COALS.

The value of coals for gas making depends primarily upon their yield of gas; and this can only be determined in an experimental gas-works or in practical working under close supervision. Chemical examination, however, affords a simple means of rapidly ascertaining whether a sample of coal is similar in quality to one which has already been proved satisfactory by the carbonization trial; and it therefore is useful in controlling deliveries of coal to gas-works. Dr. Otto Pfeiffer, of Magdeburg, has recently described in the "Journal fur Gasbeleuchtung" the methods of laboratory examination which he has found most valuable for the purpose of such control of consignments of coal; and we give below the essential parts of his communication.

In most cases a knowledge of the proportions of sulphur and ash in the coal, and of the yield of coke when it is carbonized in a crucible, suffices. The determination of these proportions must, however, be made according to uniform and precisely defined methods. The determination of the ash is of importance, if only because the gas-works themselves consume coke for heating the retorts and perhaps also for water-gas manufacture, and it is material whether this coke contains 10 or 15 per cent. of ash. Information as to the volatile sulphur bears upon the amount of sulphuretted hydrogen in the crude gas and the organic sulphur in the purified gas; while sulphur varying in amount with each description of coal remains in the coke. The comparison of coals in respect of sulphur must be limited to those of similar origin, but with this limitation the determination of the sulphur will help to control deliveries of coal. The determination of the yield of coke in a crucible has the advantage, as compared with results in the retort, that trustworthy comparative figures are afforded.

The author samples a barge-load of coal with the customary detailed precautions, and leaves the roughly broken sample for two days to dry in the air. It is then pulverized and sifted to the fineness of ground coffee. The yield of coke in the crucible is ascertained by the following method, which gives better concordance than that of Muck. One gramme of the coal is weighed into a platinum crucible of not less than 22 millimetres diameter at bottom, and 35 millimetres in height. The crucible has an overlapping lid with a hole about 2 millimetres in diameter, and is supported on a triangle of thin platinum wire 60 millimetres above the top of a bunsen burner giving a flame 180 millimetres high. The heating is continued until the ring of soot which collects round the hole in the lid has disappeared. It may be necessary to keep the hole clear by means of a wire.

The ash he determines on the same sample. After the coke has been weighed, the open crucible is set nearly horizontally on the triangle and heated with a full bunsen flame; the tip of the inner cone of the flame touching the angle of the crucible. The incineration is completed under these conditions in an hour. The lid is raised to incandescence for a moment. The results agree with those arrived at by the slow burning-off of a fresh portion of coal, as usually practised, and are obtained more quickly and with fewer weighings. The crucible, after the ash has been wiped out of it, is ready for another determination.

The sulphur in coal is generally only of importance in so far as it is volatile, or passes into the gas. Eschka's method, which gives the total sulphur in the coal, is not therefore of much service. Hempel's method, as improved by Graefe, is good. The coal is burnt in a platinum holder in a flask filled with oxygen. The flask is then treated with a solution of sodium peroxide and the sulphur determined gravimetrically. Graefe found that the presence of nitric and nitrous acids prevented the determination being made volumetrically. The author found that the platinum holder, being a good conductor of heat, prevented the complete combustion of the coal under ordinary conditions; and he therefore made a little asbestos cup to take the place of the platinum. This cup is made by shaping a wetted disc of asbestos board, about $1\frac{3}{8}$ inches across, and drying and igniting the cup so shaped. It is supported by a thick copper wire, one end of which sticks into the rubber cork which is used for closing the flask, while the other end is bent to a circle at right angles so that the cup may be supported in it and fastened to it with thin platinum hooks. The sample of coal in coarse powder, weighing 1 gramme, is put into the cup, which is then pressed together to a small extent. A flask holding about $5\frac{1}{2}$ litres, which has been filled with oxygen, is washed out by means of a hole in the cork, with distilled water which has been made quite neutral to methyl orange by means of sulphuric acid (distilled water appears alkaline to methyl orange). Then 20 c.c. of a decinormal solution of caustic alkali is introduced by means of a pipette, and washed over the walls of the flask. A small piece of glowing tinder (free from sulphur and chlorine) is placed on the sample of coal, and the rubber cork supporting the sample is inserted in the flask and pressed home. In a few minutes the coal will be consumed, and the absorption of the products will be complete in half-an-hour. The walls of the flask are then washed with neutral distilled water, and the liquid in the flask is titrated in it with decinormal sulphuric acid. It has been proved that sulphurous acid is not present in the products absorbed by the decinormal alkali; hence the amount of the latter neutralized corresponds with the sulphuric acid produced by the combustion of the sulphur in the coal. One cubic centimetre of decinormal acid corresponds to 0·16 per cent. of sulphur under the conditions of working.

The results, however, are not final. Allowance must be made for the nitric and nitrous acids resulting at the same time from the combustion. They may be determined in the neutralized liquid by means of L. W. Winkler's colorimetric brucine test. Using this, the author found that their amounts corresponded, on the average for all kinds of coal, to 0·018 per cent. of sulphur. They varied very little; the extreme results in eighteen tests of gas coals, smithy coals, Bohemian brown coal, and cellulose being 0·014 and 0·020. He therefore considers it unnecessary to determine them in each case, and proposes to deduct uniformly 0·018 from the sulphur result as the equivalent of the nitric and nitrous acids produced.

It further appeared from comparisons with gravimetric determinations that, even after this deduction had been made, the volumetric results were too high. The difference was traced to the presence of hydrochloric acid in the products of combustion. This is determined by adding a few drops of solution (1 in 10) of potassium chromate to the neutral liquid in the flask, and titrating with decinormal solution of silver nitrate. One cubic centimetre of this solution corresponds to 0·00365 gramme of hydrochloric acid, or, under the conditions of testing, to 0·16 per cent. of sulphur. The sulphur equivalent to the hydrochloric acid present, as thus determined, must be deducted from the total found volumetrically. After making these deductions, the results agree with those obtained gravimetrically by Hempel's method as modified by Graefe, as the following comparative testings show:—

Coal, Sample	*g.*	*h.*	*i.*
Gravimetric, Sulphur . per cent.	1·52	1·56	1·20
Volumetric, ,, . ,,	1·55	1·61	1·24

By this volumetric method, a sulphur determination can be completed in an hour.

The quantity of hydrochloric acid produced on the combustion of the coal in oxygen varies considerably with the different coals (the equivalent in sulphur in two samples of gas coals was 0·123 and 0·062 per cent. respectively), and appears to be typical of the kind of coal and a useful factor in identifying the kind.

About 100 tests of English gas coals from two different pits gave the following average results:—

Coal from Pit	*a.*	*b.*
Yield of coke . . . . . per cent.	68·80	71·10
Ash . . . . . ,,	6·73	6·75
Volatile sulphur . . . . ,,	1·74	1·32
Fixed carbon . . . . . ,,	62·10	64·40
Volatile constituents . . ,,	31·20	28·90
Ash in the coke . . . . ,,	9·30	9·50

PROGRESS OF GAS SUPPLY IN SWITZERLAND.

Reports of the Zurich and St. Gall Gas-Works for 1904.

We have received, through the courtesy of Herr Weiss and Herr Zollikofer, the respective Engineers of the municipal gas undertakings of Zürich and St. Gall, copies of their reports on the working of these undertakings during 1904. The advance in gas consumption in both cases is so remarkable that we purpose giving somewhat full extracts from the reports, with a view to indicating the lines which have been followed by the Engineers of these essentially progressive works in achieving such gratifying results.

The construction and equipment of the new gas-works of the town of Zürich, at Schlieren, are familiar to readers of the "Journal" through the exhaustive description by Herr Weiss, which was given in our columns in 1901, and of which a reprint has since been made in pamphlet form. Certain extensions of the new works were carried out in 1903; and these proved of great service during last year. The continued increase in consumption, however, brought a general extension of the works under contemplation, and it was initiated by the full completion of the boiler and power station. A fourth boiler, a steam dynamo of 250-horse power, and a third works water-pump were installed, and brought into use during 1904. The boiler and power plant will now suffice for the projected extension of the whole works. A third station meter, of 2,100,000 cubic feet per diem capacity, was also installed. The present extension scheme provides for one new section of 1,750,000 to 2,100,000 cubic feet productive capacity, instead of two sections, similar to those already existing, each of about half this capacity, which it was originally intended to erect. The distributing system was extended during the year by the laying of 6018 yards of new mains, and 81 new street-lamps were erected. Automatic lighting and extinguishing apparatus was introduced in 267 lamps, making a total of 973 thus equipped. From the opening of the new works up to the 30th of November last the first bench of retort-settings has averaged 1781 working days, the second bench 367, and the fourth bench 977. The third bench is being rebuilt.

During the year, 63,708 metric tons of coal and 526 tons of cannel were carbonized. The make of gas averaged 10,988 cubic feet per English ton, which is rather less than in 1903, but higher than in 1902 and 1901. There was an increase of 10·5 per cent.

in the quantity of gas made as compared with 1903. The increases for the three preceding years had been 11·9, 6·5, and 13·3 per cent. The make of gas per shift of stokers amounted to 50,745 cubic feet, which is higher than in previous years; and the make per retort per diem was 11,311 cubic feet. Coal, exclusive of cannel, cost, on the average, £1 6s. 2d. per ton, delivered on rail at Schlieren, which is practically the same as in 1903. The consumption of gas showed an increase of 10·42 per cent. Of the total consumption, 11·06 per cent. was for public lighting, 21·17 per cent. for ordinary lighting, and 52·93 per cent. for cooking and heating by private consumers. The supply to gas-engines was 3·83 per cent.; and 4·15 per cent. was unaccounted for. The balance was for sundry uses, such as the lighting of municipal buildings and consumption on the works. The highest output in 24 hours was 319,615 cubic feet, and the lowest 119,723 cubic feet. Taking the population of Zürich at 163,000, the consumption per head, exclusive of public lighting and suburban consumption, averaged 3563 cubic feet per annum—an increase of 6·5 per cent. on the preceding year. The increase was chiefly in respect of heating and cooking, but all classes of consumption showed a gain.

The following statement gives the yields of bye-products, expressed in percentages of the weight of coal carbonized: Coke, 73·20; ammonia (in gas liquor), 0·189; tar, 6·503; thick tar, 0·408; producer clinker, 3·61; retort scurf, 0·124. The coke consumed in heating the settings amounted to 14 per cent. of the coal carbonized. Coke and tar fetched better prices than in 1903; but there was a slight depreciation in the price obtained for sulphate of ammonia. The efficiency of the retort furnaces was kept under control by frequent analyses of the chimney gases. The spent gases on entering the main flue at a temperature of about 600°C. were free from carbonic oxide, and contained from 14 to 15 per cent. of carbonic acid. Assuming that they contained 10 per cent. of aqueous vapour, an average efficiency for the producers and furnaces of 62 per cent. was realized, which must be regarded as being very good indeed. Owing to the use of more porous oxide than formerly, the cyanogen compounds were not so completely removed from the gas as hitherto. The proportions of sulphur and prussian blue in the spent oxide fell from 48·35 and 7·09 per cent. to 47·2 and 5·2 per cent. respectively. The gas was kept free from sulphuretted hydrogen throughout the year. The consignments of coal were as far as possible tested for quality at the small experimental works.

Less than 1 per cent. of the street-lamps are now lighted with flat-flame burners. The average consumption of mantles in the public lamps was 3·82, and of chimneys 1·7, per burner per annum. Prepayment meters have now been sanctioned for use by the Municipality, and 12 were installed towards the close of the year. The suburb of Orlikon has been added to the four suburbs previously supplied with gas from the works; and the consumption in all the suburbs showed considerable growth. The report for the year contains diagrams showing graphically the relative consumption for various purposes at different periods of the year, the daily consumption in 1903 and 1904, and the growth of the consumption for heating and cooking during the last five years.

The report on the St. Gall Gas-Works for 1904 contains many particulars in regard to the new works at Riet, on the Lake of Constance, which were given in the description of these works lately published in the "JOURNAL" (*ante*, p. 378). Little more remains to be done at them to complete the scheme of construction. The erection of offices and some workmen's dwellings has still to be finished, and the drainage system of the works completed. The production of coal gas at the old works ceased on April 16, 1904, and that of water gas on the 7th of November last, since which date the manufacture of gas has been confined to the new works. The new carburetted water-gas plant at the latter was put into operation on the 10th of November. The particulars of the trial of this plant may be quoted by way of supplementing the similar particulars already given of the new retort-settings.

The trial extended over eight days, and comprised 87¼ working hours for a set, inclusive of the time spent in clinkering. The gas made from 16·92 tons of coke and 12·69 tons of oil amounted to 1,089,520 cubic feet. It had, without removal of 3·38 per cent. of carbonic acid, a calorific power of 597 B.T.U. gross and 557 B.T.U. net per cubic foot. When burnt in a batswing burner at the rate of 5·3 cubic feet per hour, it gave a light of 13·2 candles, and when burnt in an (Elster?) argand burner at the same rate a light of 19·8 candles. The coke used per 1000 cubic feet of gas made was 34·8 lbs., and the oil 26·1 lbs.

The cost of production of water gas has been lower than in preceding years. The figures for 1904 are, per 1000 cubic feet of gas made:—

	Pence.
For coke and oil	14·64
,, wages	1·08
Gross cost	15·72
Less value of oil tar	0·98
Net cost of production	14·74

The net cost of the mixed gas sold, inclusive of administration, interest, amortization, maintenance, and working charges, amounted to 4s. 5½d. per 1000 cubic feet; and the net cost of production (materials and wages only) per 1000 cubic feet sold was 1s. 6¾d. for the coal gas and 1s. 3¾d. for the water gas. Having regard to the transition from the old to the new works having been in progress, these figures are considered satisfactory. Coal cost £1 7s. 7d. per ton, including 8d. for transport from rail to the retort-house. Coke, tar, and ammoniacal liquor gave somewhat better returns than in 1903. Much of the ammonia in the gas was retained in the cyanogen sludge, which realized a net return of 1·39d. per 1000 cubic feet of coal gas.

The increase in gas consumption over 1903 amounted to 12·8 per cent. The price of gas was 18 c. per cubic metre (4s. 1d. per 1000 cubic feet) during the seven summer months, and 25 c. (5s. 8d. per 1000 cubic feet) during the five winter months. The public lighting accounted for 8·26 per cent. of the total gas consumption, and 1·49 per cent. was sold for use in gas-engines. No distinction was made between gas sold for lighting and heating or cooking; but the increase in consumption was 17·3 per cent. in the summer against 9·4 per cent. in the winter months—indicating that the major part of the increase for the year was due to cooking by gas. At the end of 1904, there were 501 street-lamps fitted with automatic lighting and extinguishing appliances, the use of which is to be further extended. Prepayment meters do not appear to be in use at St. Gall. The consumption of gas in the town itself amounted in the year to 4020 cubic feet per head of the population.

These particulars, which are only a tithe of the statistics collected in the two reports, indicate what can be accomplished in the direction of cheapening the production of gas and of pushing its sale in a country where coal and other fuel are extremely dear. The high cost of fuel compels users to study economy in its selection and use; and under these conditions gas is fully able to secure increased application merely as a fuel—*i.e.*, for cooking and heating. Economy in manufacture is carefully studied in the more advanced Swiss works; and the cost of conveying the coal from the railway sidings to the coal-stores and thence to the retorts works out at only 4·3d. per ton at Zürich, 4·4d. at Winterthur, and, as already mentioned, 8d. at St. Gall. The latter figure will, of course, be considerably reduced when the conveying plant is in operation throughout the working year, which was not the case in 1904. Curiously enough, the prepayment meter is only now coming into use, perhaps because the works have hitherto found the increase in the requirements of ordinary consumers as much as they could cope with. A feature of both Zürich and St. Gall is the general adoption of automatic lighting and extinguishing devices for street-lamps, with apparently very satisfactory results.

Explosions of Mixtures of Coal Gas and Air.

There has recently been published a paper read by Messrs. L. Bairstow and A. D. Alexander, before the Royal Society, on "Explosions of Mixtures of Coal Gas and Air in a Closed Vessel." The authors carried out three series of experiments, the results of which may be summarized as follows: Mixtures of coal gas and air are not inflammable until the volume of the former is greater than 1-17th of the combined volumes. Only a very small fraction of the gas then burns; the amount consumed rapidly increasing with the greater richness of the mixture, until the coal gas is 1-12th of the total volume. The least inflammable of the constituents then burns, and combustion becomes and remains complete so long as air is in excess. In the latter cases it is still probable that the constituents burn successively and not simultaneously. The hypothesis of a specific heat increasing with temperature is not supported by direct experiment, and cannot be proved by any work on the pressures produced by explosion; the authors believing that a proof would require the measurement of temperature. Direct experiments by Deville at temperatures below 1400° C. have shown that both steam and carbon dioxide are partially decomposed, and this dissociation is therefore taken as the sole explanation of the difference between the pressures calculated for explosions in a closed vessel and those actually obtained.

The Kitson Light.

In the "Industrial Progress" section of "Technics" this month, there is an article descriptive of the Kitson incandescent oil-lamp system; and it is composed of much of the interesting matter that has already been published in the "JOURNAL" at various times, but here it is presented in a single view. However, though the matter is not new to us, much of it will be to others, and especially so to the general public, to whom the popularly-written technical magazine named appeals. The illustrations accompanying the article show that the Kitson system has been applied to many new designs of lamps. There is the "Empire" suspension lamp, for example, which is shaped much like an arc lamp, and which is controlled by the Kitson Light (Foreign Supply) Company, and may be seen at No. 100, St. Martin's Lane, W.C. The last paragraph of the article says: "After all, the success of an invention depends upon what the public think of it; and this is gauged by the number sold. Judging of this invention from this standard, it must be admitted that the Kitson Light has been a remarkable success. More than half-a-million lamps have been sold during the past seven years; and the Kitson Light (Foreign Supply) Company claim that the business may now only be said to have been fairly started."

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting at Dundalk.

THERE are evidences, all over the United Kingdom, that the spirit of association has at the present moment a strong hold upon gas engineers and managers. As a consequence, taken as a whole, the Associations are in a very healthy condition. This is eminently true of the Irish Association of Gas Managers, whose annual meeting—the eighteenth—was held at Dundalk last Tuesday. Beginning in an area confined to the North of Ireland, where, with one exception, the gas-works may generally be classed as small, and receiving little encouragement from those in high places, the Association was comparatively insignificant as a power, and made disappointing headway. But after the extension of its territorial boundaries so as to include the whole of Ireland, its progress has been rapid. Till the present time, it has been necessary to give assistance to the members, in the conduct of their meetings, by the employment of lecturers, who discoursed upon subjects of importance to them all, but too deep for effective discussion by them. Judging by the meeting at Dundalk, that is no longer necessary. The members proved themselves capable, without aid, of carrying on a highly interesting meeting—providing sufficient pabulum, of a meritorious nature, for a more than ordinarily prolonged sitting. The truth is there are now in the ranks of the Association a large number of capable gas engineers—men who are fit to give an intelligent reason for anything they may do, and full of activity as they are of resource.

Among these may be mentioned the President—Mr. G. Airth, of Dundalk—who is one of the many successful gas managers to be found over the United Kingdom who owe their advancement to the excellent training they received, in their early days, from Mr. George R. Hislop, in the gas-works at Paisley. It would be invidious to mention others; but the discussions at the meeting, as reported, will testify as to the quality of "Young Ireland," so far as gas management is concerned. In his address, Mr. Airth set up a high standard of attainment for managers of gas-works, much higher than is probably ever likely of general realization. But there was one passage which all might consider; and that was where he suggested to the owners of gas undertakings that, if they had money to invest, they could most profitably invest it in their own business. There are two ways of thinking about this proposal. The one is that advanced by the President; and the other is this: The reserve funds of a gas undertaking are set apart for special purposes; and it is not sound financial policy to invest them in any other than gilt-edged, and so easily realizable, securities. By their investment in the works, they are no longer available reserves. The difference between the 3 per cent. or so return and the 15 per cent. which Mr. Airth assured his hearers could be earned by themselves upon their own money, is the price of security. The gas undertaking with available reserves is stronger than the one without, and is so regarded by the public. Our most successful gas and financial administrators will not recognize the President's proposal as inuring to stability. Moreover, the course that should be taken is plainly defined by the Gas-Works Clauses Act, 1847, which provides that, if the clear profits of the undertaking in any year amount to a larger sum than is sufficient (after making up the deficiency in the dividends of any previous year) to provide a dividend at the prescribed rate, the excess beyond the sum necessary for such purpose shall from time to time be invested in Government or other securities. There is a direction here the meaning of which is very clear.

Valuable papers were contributed by Mr. C. B. Outon, of Inchicore, and Mr. D. W. Tooms, of Fermoy. Mr. Outon is well known in the Association to be one of the scientific pillars of the body; and it may be said of him that, whatever he takes up, he so applies his mind to it that he enriches the subject. That he did so on this occasion, when he described the Inchicore sulphate plant, and showed its adaptability to small gas-works, was admitted all round. Mr. Tooms has yet to make his reputation; but he had a very creditable contribution to the business of the meeting. It is widely known that Mr. C. B. Tully, of London, at one time Gas Manager at Sligo, takes an active interest in the evolution of some of the deeper problems connected with gas making. The production of methane-hydrogen gas has for some time occupied much of his attention. Plant for producing it is now, as readers are aware, in existence in the Truro Gas-Works; and Mr. Tully (who loves to appear among his old comrades in Ireland) treated them to a short description of what has been accomplished. The interest in it will probably develop as, in time, the statistics of working throughout a year (say) are available. Mr. Tully's paper was an "extra," which came in at the last moment. In anticipation of a shortness of supplies, it had been arranged that Mr. R. Bruce Anderson, of London, should open a discussion upon the percentage of gasholder storage to maximum daily output. Mr. Anderson opened up the subject at a late hour, when the attendance had thinned down considerably, which was to be regretted, because the subject was well fitted to elicit the opinions of members. An occasion may be taken for making editorial reference to it later on.

It only remains to be said how admirable were all the arrangements made by the Hon. Secretary (Mr. J. Whimster, of Armagh) both for the meeting itself and for the excursion the following day. The latter is always an event that, in itself, makes the meeting in Ireland worth patronizing; and on this occasion, in the opinion of those present, it outshone, if that were possible, all its predecessors.

General Report.

The Irish Association of Gas Managers held their Eighteenth Annual Meeting in the Council Chamber, Town Hall, Dundalk, last Tuesday. Mr. G. AIRTH, of Dundalk, the President, occupied the chair. The number of members and friends who were present was reckoned to be larger than has ever yet attended any of the gatherings of the Association.

WELCOME TO THE TOWN.

Mr. W. TEMPEST, J.P., the Vice-Chairman of the Dundalk Gas Company, in the absence of the Chairman of the Urban District Council (Mr. Henry O'Connell, J.P.), extended to the Association a welcome to the town on behalf of the Gas Company. He explained that their worthy Chairman had hoped to be present, but that business had called him elsewhere. In welcoming them to the town, he did so very cordially, because he thought meetings of this kind were calculated to do immense good, not only to the great enterprise in which they were all engaged, but to the community at large. All municipalities in Ireland were more or less dependent upon the gas companies who lighted the different towns; and the greater the enterprise of the gas companies, the greater the prosperity, in a large degree, of the towns in which they worked. The cheaper the gas, for instance, the less tax it was on the resources of the community. Therefore it was that he thought combinations of this kind did so much to bring together men of intelligence and of experience, who did so much to illustrate and to work out all the improvements which, in these days of competition, were so necessary to keep gas companies to the front. There was fierce competition, no doubt, going on between electricity and gas lighting; but it had been proved that, wherever electricity had been introduced, gas lighting kept pace with it, and that gas companies prospered. They had not yet got electricity in Dundalk as a competitive force in connection with the Gas Company; but they had produced a form of lighting with gas in the town which, to a large extent, took the place of electricity. He was not so selfish as to hope that electricity would not come into Dundalk. He should welcome it, because he thought that, with the advent of electricity, prosperity to the Gas Company would be assured. Therefore it was that he thought gas lighting and electric lighting should go hand in hand. He was glad to say that the Gas Company worked very harmoniously along with the Town Council. It was a good sign of the times when men combined to work together for the good of any town. Everything would then prosper. In welcoming them to Dundalk, he did so, among other reasons, because they had, as President, their worthy Manager. It was a satisfaction to the Directors to know that the Association had so much confidence in Mr. Airth. Since he came to Dundalk, Mr. Airth had been a very successful Manager, and he was giving the greatest satisfaction to the Directors.

REPORT OF THE COMMITTEE.

The Report of the Committee, which was read by the Hon. Secretary (Mr. J. Whimster, of Armagh) was as follows:—

In presenting the annual report, the Committee are glad to state that the Association continues in a healthy and flourishing condition. The meetings are better attended year by year; and last year's meeting in Armagh was marked by a very large attendance, representative of all parts of the country. Last year your Committee took a new departure, and presented the President—Mr. James Whimster—with a gold medal, suitably inscribed, as a memento of his year of office. This year they are presenting one to Mr. Airth; and, subject to the approval of the general meeting, they purpose making this an annual event.

As a result of the resolution adopted by the general meeting last year, the Association have become affiliated with the Institution of Gas Engineers. Several of our members availed themselves of the privilege contained in the terms of affiliation, and joined the Institution last June; and the Committee beg to remind members that if they wish to join the Institution as individual members, they ought to get themselves nominated for the next annual meeting in June, and thus save the entrance fee. The Committee were called upon to nominate a District Member of Council, to represent the Association on the Council of the Institution from June of this year; and they nominated Mr. Whimster as your first representative. It will be for the general meeting now to make the nomination for next year.

The Committee regret exceedingly the lamented death, in May last, of our only remaining honorary member, Professor Tichborne, of Dublin. They sent a wreath, in the name of the Association, to his funeral. He was our first honorary member, having been elected in 1892; and during these thirteen years he had been a good friend of the Association—he and the late Professor Macadam having been the recognized Lecturers at our annual meetings. His cheerful and genial presence at our meetings will be much missed.

The abstract of accounts and the Auditors' report are presented herewith, and show a balance of £55 15s. 5d. in hand.

Financial Statement.

The Auditor (Mr. G. W. Norman, of Dublin) submitted the financial statement, bringing out the balance mentioned in the report of the Committee.

The President said that last year the Committee made a new departure in presenting the President with a medal, suitably inscribed. This year they were presenting one, subject, of course, to the approval of the Association; and they proposed to make it an annual event. Another matter which came before them was the nomination of a representative on the Council of the Institution of Gas Engineers.

Mr. B. Gibson (Newry) proposed, and Mr. C. W. Stott (Parsonstown) seconded, the adoption of the report; and it was agreed to unanimously.

The President said this meant that they were to give to their President a medal annually.

Representative on the Institution Council.

Mr. R. Harrison (Monaghan) moved that Mr. Whimster, the Hon. Secretary, be re-elected their representative on the Council of the Institution of Gas Engineers.

Mr. W. H. Roberts (Newtonards) seconded.

Mr. J. G. Tooms (Waterford) was sorry to propose an amendment; but he thought this was an office which should go round. It was not from any feeling that Mr. Whimster was not a suitable man, or that he would not do full justice to them as their representative; but he did not think they should bind themselves to the same man year after year, any more than they should have the same man President year after year. He did not minimize the valuable services Mr. Whimster had rendered to the Association; but he proposed that Mr. Airth should be nominated their representative on the Council of the Institution.

Mr. J. Paterson (Queenstown) seconded.

In the course of a discussion which followed, Mr. T. J. Reid (Ballina) proposed that the office of representative to the Council should go by rotation, and should be held by any individual man for one year only.

This was carried by 16 votes to 9.

Mr. Tooms repeated his motion that Mr. Airth be nominated; and Mr. Paterson seconded.

The Vice-President (Mr. R. B. Anderson, of London) put the motion to the meeting, and declared it carried by acclamation.

The President thanked the members for the honour they had conferred upon him by making him their representative. He would much have preferred that they had appointed Mr. Whimster, who had been constantly in touch with the affairs of the Association; but he promised this, that they would get a full report from him as to his work on the Council.

Mr. Whimster asked to be allowed to add a word now. He had said nothing all through the discussion, for the reason that he had not yet attended a meeting of the Council, beyond a preliminary gathering at the end of the last meeting of the Institution. He then got some inkling as to what was to be done, and Sub-Committees were appointed. So he knew nothing of the working of the Council, and was not able to give in a report; and he did not know whether or not the position of representative on the Council was one to be envied. The only thing he felt in the matter was that he was nominated as their first representative by the Committee. He would have liked if the members of the Association had supported that nomination, as it would not have made it appear that he had been put in by a clique. This was the only thing that influenced him in the whole matter.

New Members.

The following were admitted members of the Association:—

Ordinary Members.—Pollock, R., Mauchline, N.B.; Barnet, A., Thurles; Marshall, R., Dromore; Buckley, W., Cork; and Gillespie, J. (of Glasgow), consulting engineer, Larne.

Extraordinary Members.—Hurll, J. K., Glasgow; Whimster, J. P., Glasgow; Price, C. W., London; Whitfield, S. C., Manchester; Emmerson, R., Glasgow.

Election of Office-Bearers.

The President proposed that Mr. R. Bruce Anderson be elected President.

Mr. C. B. Outon (Inchicore) seconded the motion; and it was cordially agreed to.

Mr. Anderson sincerely thanked the members for the very kindly manner in which they had elected him to the office, and said he hoped he should fully deserve the acclamations with which his nomination had been received.

Mr. J. Richmond (Kilkenny) proposed, as Vice-President, Mr. P. Conroy, of Galway.

Mr. J. G. Tooms (Waterford) seconded the motion, which was agreed to.

Mr. Conroy briefly returned thanks.

For members of Committee, the following were elected: Mr. J. Brodie (Omagh), Mr. N. Allan (Sligo), and Mr. F. Eustace (Tullamore).

The President said he had much pleasure in proposing that Mr. Whimster be re-elected Hon. Secretary and Treasurer. A better man they could not have.

Mr. Tooms seconded; and it was agreed to unanimously.

Mr. Whimster thanked the members for again re-electing him, as the duties of the office were a labour of love to him. He was deeply interested in the success of the Association. He was glad to see it had grown as it had done; but the work was getting rather laborious, and he hoped they would think, some time in the near future, of putting someone else into the place.

The President proposed that they reappoint Mr. G. W. Norman, of Dublin, as Auditor of the Association.

Mr. C. W. Stoll (Parsonstown) seconded, and the motion was agreed to.

Place of Next Meeting.

Mr. Anderson suggested that the next meeting should be held in Dublin; but in view of the doubt as to whether the proposed exhibition would or would not be held in 1907, he would like to take the opinion of the members as to whether they should meet in Dublin next year or the one following.

Mr. Norman said no one could tell whether or not the exhibition would be ready for 1907; but if they decided upon Dublin, and it was found that the exhibition was to be held in 1907, the Committee could, within two months, alter the place of meeting to the Provinces, so as to allow the gathering to be held in Dublin in the exhibition year.

This suggestion was agreed to—Dublin being selected on this understanding.

The Association's Medal.

The proposal was made that the medal of the Association should be given to all Past-Presidents; but, after a discussion, it was negatived.

Inaugural Address.

The President then delivered his Inaugural Address, which was given in the "Journal" last week (p. 439).

Mr. R. B. Anderson proposed a hearty vote of thanks to the President for the able and interesting address with which he had favoured them. Perhaps he might first congratulate him upon the very large attendance, which testified to his popularity. Dundalk seemed to have always been a very go-ahead place, and they had been told that it held the most advanced ideas. It was very seldom they heard of gas companies ready to welcome the introduction of electricity, although he had always held it to be the right thing. Dundalk was one of the first towns to have a supply of gas. In 1862—43 years ago—they had tried cooking with gas in Dundalk; whereas few gas managers knew much about it thirty years afterwards. Going back ten years from that, they had water gas introduced; and again it was only now becoming fashionable. Then they had gas at 5s. per 1000 cubic feet in 1862. In London shortly before that the charge was 6s. This, he thought, must have been unique, for a town of the size of Dundalk. He considered that 3s. 9d. must be as low a figure as could be found in any place of the same size. The President had drawn attention to trifles which, when attended to, assured success—such as leakage in the retort-settings. The matters referred to might appear trifling; but it seemed to him they were of very great value.

Mr. Whimster, as a Past-President, seconded the motion. He remarked that he would not repeat what Mr. Anderson had said, but he had the very pleasant duty to perform of putting round the President's neck the Association's medal for the year 1904-5, which was a replica of the one presented to him last year.

The President, in returning thanks, said that when he joined the Association, his ambition was to be President. He did appreciate all that had been said about him; and he thanked the members for the presentation of the medal.

Visit to the Gas-Works.

At this point the meeting was adjourned for an hour, during which time a visit was paid to the gas-works, where light refreshments were provided by the President.

Papers and Discussions.

On the resumption of the proceedings,

The President reminded the members that they had a great deal of work to get through. If the authors of the papers would agree to take their papers as read, it would save time. They had been sent out by post to the members, who were thus familiar with them.

The suggestion was agreed to.

Mr. C. B. Tully (London) read the first paper [see p. 497] on the "Manufacture of Carburetted Methane-Hydrogen Gas."

The Death of Mr. Russell Wall.

In the course of the discussion upon the second paper read,

The President rose and said he had just had placed in his hands a telegram which the members would all receive with the very deepest regret. Their good friend Mr. J. Russell Wall, of London, had passed away at midday. He was sure they would all feel very much the loss of Mr. Wall. He was a genial, kind good-hearted fellow, to whom he personally was under some obligation. He was sure they heard with much regret the sad intimation.

Mr. ANDERSON thought that, under the circumstances, a communication might be sent to Mr. Wall's friends, saying how deeply the meeting had been touched by the sad intelligence they had received.

It was agreed that a telegram to this effect should be sent; and that the Hon. Secretary should write a letter of condolence to the relatives of Mr. Wall.

[Mr. Wall was one of the extraordinary members of the Association, and regularly attended the meetings.]

THE REMAINING PAPERS.

Mr. C. B. OUTON (Inchicore), submitted a paper [see p. 499] entitled "A Description of a Modern Sulphate Plant, adapted to a Small Gas-Works;" another, entitled "The Working of Generator Settings with External Producers," was furnished by Mr. D. W. TOOMS, of Fermoy; and a discussion took place on the proposition "That, in view of the increase in the day consumption which has taken place of late years, 60 per cent. of the maximum daily output may be considered sufficient gasholder storage"—the subject being introduced by Mr. R. BRUCE ANDERSON, Assoc. M.Inst.C.E., of London. These last two items on the programme will be noticed in the "JOURNAL" next week.

CLOSING PROCEEDINGS.

The PRESIDENT, in bringing the proceedings to a close, said he thought they had had a really good and profitable meeting. They had certainly spent a longer time over the business than at any meeting at which he had been present.

The HON. SECRETARY remarked that they should not separate without proposing a hearty vote of thanks to Mr. Airth for his conduct in the chair.

This was agreed to unanimously.

The HON. SECRETARY also proposed a vote of thanks to the authors of the interesting papers submitted, which had furnished so many subjects for discussion.

This also was agreed to unanimously.

Mr. J. G. TOOMS proposed a vote of thanks to the Hon. Secretary; and this having been accorded, the meeting ended shortly before seven o'clock.

THE DINNER AND EXCURSION.

In the evening the members and friends, including ladies, to the number of nearly eighty were the guests of the Dundalk Gas Company at dinner in the Market House; the food being cooked entirely by gas. Mr. W. Tempest presided. Mr. R. B. Anderson proposed the toast of "The Dundalk Gas Company." The toast of "Continued Success to the Gas Managers of Ireland" was given by Mr. J. Cox, a Director of the Dundalk Gas Company, and was replied to by Mr. Anderson, who also proposed "Kindred Associations," to which Mr. R. G. Shadbolt responded. As is customary at the festive gatherings of the Association, an excellent programme of musical and other entertainment was organized by Mr. G. W. Norman, of Dublin. Time passed so pleasantly that the end had not been reached when, after midnight, the Chairman brought the proceedings to a close by calling upon the company to join in singing "Auld Lang Syne."

On Wednesday, a company of seventy ladies and gentlemen went on an excursion—doing what is known as the Boyne Valley tour. Leaving Dundalk shortly after nine o'clock by train for Drogheda, coaches were mounted there, and the party drove to the obelisk which marks the spot where one of the moving incidents in the historic Battle of the Boyne occurred. Transferring themselves to a steam launch, a trip was enjoyed, alternately on river and canal, through a long stretch of most beautiful scenery, in some parts almost tropical in the richness of the enshrouding greenery. On the way a halt was made, and the company lunched on the grass—an experience which was novel to many, and which was productive of much merriment. At the end of the sail, at Slane Bridge, the excursionists joined the conveyances which had been sent on to meet them, and drove to Drogheda, where they had tea in the Tredagh Hotel. After tea, Mr. A. Mackenzie, of Edinburgh, on behalf of the subscribers, with a few felicitous remarks, presented Mrs. Airth with a gold brooch, as a token of the esteem the members of the Association entertain towards her. Mrs. Airth briefly expressed her thanks, which were supplemented by a few remarks by Mr. Airth. The brooch was what is known as a Queen's Zara one in 18-carat gold. It was referred to as noteworthy that the presentation was made by a company which had that day been within three miles of the famous Hill of Zara. The company broke up rather hurriedly, to enable the north-going members to catch the 6.40 p.m. train.

PERSONAL.

Mr. LAURENCE HISLOP, of Paisley, has been appointed Manager of the Berwick and Tweedmouth Gas Company.

Mr. R. W. COWIE, of Glasgow, has been appointed Manager of the Lockerbie Corporation Gas-Works, in the room of Mr. Samuel Miller, resigned.

SOUTH-EAST OF IRELAND GAS ASSOCIATION.

Quarterly Excursion Meeting.

This Meeting was held in Dublin on Monday last week—the day before the meeting of the Irish Association. The members and lady friends assembled at 1 p.m. at the Wicklow Hotel, where luncheon was served.

Through the kindness of the Chairman of the Mining Company of Ireland, the party were afterwards conveyed in brakes to the lead works of the Company, which are beautifully situated at Ballycorns, among the Wicklow Mountains, ten miles from Dublin and three or four miles from Enniskerry. They were conducted through the different departments of the works, and the various operations were fully explained, by Messrs. Woods, Macguire, and Roberts, the Chairman, Secretary, and Manager respectively. Great interest was manifested in the operation of smelting lead from the ore; and the extraction of silver from the crude lead excited much interest among the ladies of the party. In connection with the works there is a main flue to a chimney-stack on top of an adjacent hill. This flue is more than a mile long, and is supposed to be the second longest in the world. The last time it was cleaned, 180 tons of lead were recovered from it.

After the inspection of the works the party proceeded on to Enniskerry, where they were entertained at tea by Mr. and Mrs. Woods. Afterwards they proceeded through the world-renowned Dargle Glen, the romantic scenery of which was much enjoyed. On the journey home, which was made *viâ* Bray, a halt was called at the beautiful residence of Mr. and Mrs. Woods, where light refreshments were partaken of. The host and hostess were enthusiastically thanked for their lavish hospitality, and hearty cheers were given on the party proceeding to Dublin. Thus ended what was universally voted one of the most successful and enjoyable meetings of the Association.

The Monazite Sand Purchase of the South Metropolitan Gas Company.

There seems to be an unnecessary amount of perturbation over the purchase of a monazite sand property in North Carolina by the South Metropolitan Gas Company. Let us assure friends who read the "Ironmonger" that there is no move on the part of gas companies against the mantle makers and the retailers. The fear of any attack on their trade is altogether groundless, so long as there is no lack of good and cheap mantles. This is a condition that rests largely with the Thorium Convention in Germany, and in a measure with the makers of mantles. We know that there are good and cheap mantles on the market at the present time; but we also know that there is a greater abundance of poor mantles than is at all pleasant for the suppliers of gas, who do not look with joy upon their own commodity being brought into disrepute by such goods. These inferior mantles are largely the product of the higher prices that have ruled for thorium now for a considerable period; certain makers getting all they can, at the expense of the mantles, from a kilo. of thorium to (as we have put it before) compensate them for the increased price. We repeat that the action of the South Metropolitan Gas Company in purchasing the monazite sand property is simply one of self-protection; and if they chose to do this, the right is just as much theirs as of the individual. In respect of it, the farthest they have got in determining as to the future is the making of arrangements for the recovery of the thorium from the sand; beyond that, no decision has been arrived at. Sir George Livesey, however, has made it perfectly clear that the Company have no intention of competing with the mantle trade; but they do retain the freedom of being guided by circumstances as they arise. The "Ironmonger" remarks that, "as a matter of interest, we have it on good authority that the corner in monazite is not so threatening as is sometimes believed by those only indirectly interested." It is sufficient reply to ask, Who have been responsible for putting up the price of thorium in the past two or three years from 34s. to 54s. per kilo.? The control of monazite and thorium is in few hands; and practically all the hands are interlinked. No one outside the "convention" knows what the next move will be; and it is not a comfortable reflection for the gas industry that the control is so limited. Referring to Sir George Livesey's statement at the South Metropolitan meeting that "they had not got the monazite sand yet, but they had made arrangements with a responsible firm to convert the sand into thorium," the "Ironmonger" applies a remark as to "unhatched chickens." Our contemporary must be easily persuaded by outside influence if it supposes that the South Metropolitan Company's Chairman and Directors are men who enter into transactions of this kind without taking every possible means of ascertaining whether a property is worth buying before making the purchase. In the first place, all that Mr. Bush and Mr. Carpenter did was to agree to purchase, on the terms named, if the property should be found to be what was represented. Then the Company sent out Mr. Tysoe and another official of the Company, with a reliable Mining Engineer, to investigate the property; and these gentlemen, so far as can be seen, erred if at all on the side of caution. Nothing more than this of any value can be said until the Company obtains a consignment of the sand.

THE METHANE-HYDROGEN GENERATOR

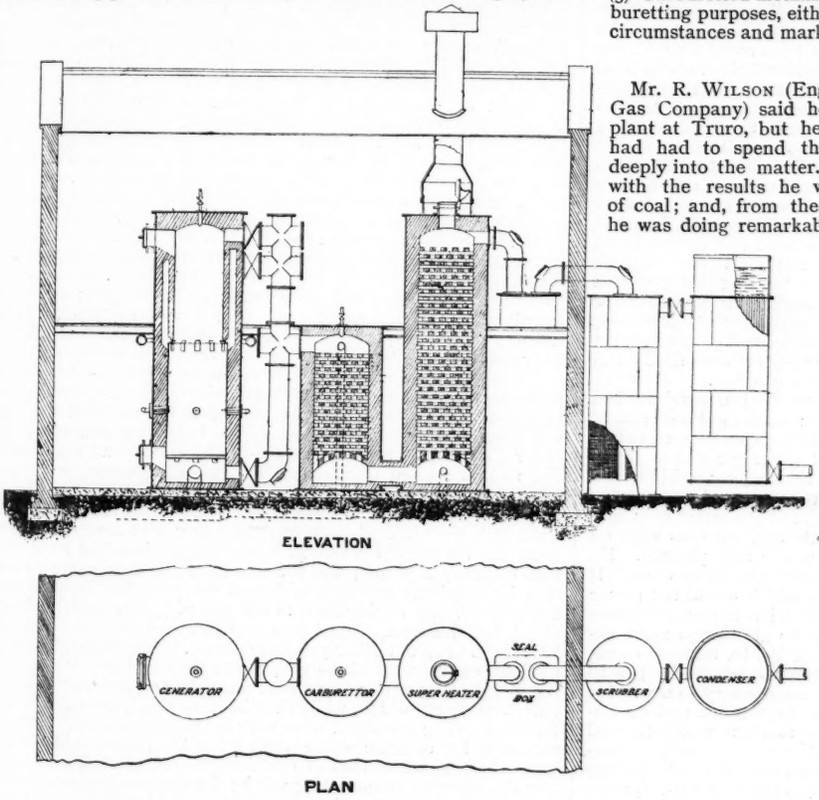
ADAPTED TO A CARBURETTED WATER-GAS PLANT FOR THE PRODUCTION OF CARBURETTED METHANE-HYDROGEN GAS.

By C. B. Tully, of London.

[A Paper read before the Irish Association last Tuesday.]

In the manufacture of carburetted water gas, more oil and coke is consumed than is desirable from an economical point of view, and the gas passing from the carburettor and superheater contain much undecomposed oil, in the form of tar or other heavy hydrocarbon, that has been separated from the gas in the scrubber and condenser, and forms a useless bye-product for gas-making purposes for which there is very little demand on the market. From experience gained with the methane-hydrogen generator at Truro for the past nine months, it has been practically demonstrated beyond doubt that tar can be economically and usefully employed in the generator for the production of methane-hydrogen gas of an illuminating power of about 8 candles, and of a calorific value of 400 B.T.U.

In the methane-hydrogen plant, tar is injected during gas-making; the volatile hydrocarbons passing away with the gas, and the carbon and heavy tar remaining with the coke in the generator and being utilized as carbon. The combination of the methane-hydrogen generator with the water-gas plant has been designed for the purpose of producing an oil-carburetted gas of any desired illuminating power, in such a way as to admit of the employment of a large quantity of tar or other heavy hydrocarbon (which at present is very cheap) and the use of less oil and coke, which are comparatively dear, than heretofore. The manufacture of carburetted water gas is thus considerably cheapened and improved in quality, and with this process the gas manufactured will contain less carbon monoxide and more methane and hydrogen than ordinary carburetted water gas. The mode of operating this plant is similar to that adopted in carburetted water-gas practice, except that the blast is caused to pass through only the lower portion of the fuel in the generator, and at a definite height, with the result that a constant uniform gas of any quality can be produced by the regulation of the blast.



A Carburetted Methane-Hydrogen Gas-Plant.

The gas so obtained during the blow is mixed with air, and burned in the annular lining in the upper half of the generator, for the purpose of bringing the coke in this part of the generator to a high temperature without causing its combustion. Simultaneously tar is injected into the upper portion of the fuel thus heated, and then decomposed. The solid products of the tar being deposited in the fuel, the volatile portion descends to the nostrils, mixes with the blast gases, and passes up through the annular lining into the carburettor and superheater. The combined gases are then burned with air to produce the necessary working temperatures.

In this way the tar is utilized in the place of coke. When the plant is heated to the necessary temperature, the blast and snift valves closed, and the exit of the gas from the nostrils prevented by reversing the two-way valve, which at the same time opens the gas-way at the top of the generator, steam and tar are injected into the lower fuel in the generator, and oil is sprayed into the top of the carburettor. At the same time, tar is injected into the upper heated fuel bed, through which the gaseous products resulting from the decomposition of the steam and tar from the lower portion of the generator have to pass. These gases deposit in the coke the heavy tars and free carbon, which are retained by it as fuel.

The hydrocarbons from the tar injected into the lower part of the generator and those obtained from the tar injected into the upper bed of fuel pass with the gas formed into the carburettor, where they are mixed with the gases resulting from the decomposition of the oil, and are there fixed into permanent gas. The gas is then passed through the scrubber and condenser, and on to the gasholder in the usual manner. In this way a large quantity of tar and a relatively small quantity of oil can be used; and, owing to the continuous deposition of solid carbon in the coke in the generator resulting from the decomposition of the tar, the consumption of coke is retarded, and less of it is used.

The result of the use of this process of manufacture is that the quality of the gas is improved, and the cost is considerably reduced, as compared with the ordinary mode of manufacture.

With this process, any quality of gas can be produced at will, viz.: (1) Methane-hydrogen gas. (2) Carburetted water gas. (3) Carburetted methane-hydrogen gas. (4) Blue gas. For carburetting purposes, either benzol or oil can be used, according to circumstances and market prices.

Discussion.

Mr. R. Wilson (Engineer of the Malta and Mediterranean Gas Company) said he had seen the methane-hydrogen gas plant at Truro, but he was very sorry that the short time he had had to spend there prevented him from looking very deeply into the matter. Mr. Ingram had shown him his books, with the results he was obtaining from a certain quantity of coal; and, from the appearance of things, he should think he was doing remarkably well. Of course, it was all in an experimental stage; and it was a little difficult to form opinions from what could be seen in a couple of hours. His idea was that it would be the thing of the future, and that when the plant was arranged for using light tars and tar oils, with the carburetted water-gas plant, much good would be obtained from it.

Mr. J. G. Tooms (Waterford) said he understood that the President himself was in Truro examining the plant, and he was sure the members would be glad to have his impression, as a practical man in carbonizing, of its capabilities.

Mr. R. B. Anderson remarked that in the paper Mr. Tully stated that at Truro they could make 8-candle gas, of 400 B.T.U., in the generator alone. Was he to understand that this was got from the generator, without using the carburettor? [Mr. Tully: Yes.] In that case there was a wonderful field, in works such as the members were connected with, for what appeared to be a very simple apparatus. In ordinary carburetted water-gas plant, they had, after the fixing chamber, a product which was suitable for use; whereas in the generator only one-third of the plant was involved. An 8-candle power gas seemed to them to be a very low one indeed. But there were towns in Germany where gas was made from a coal which would not yield gas above this quality, and the almost general use of incandescent burners in these towns was due to this fact; and if in this country they did not want a very rich gas, and they could not afford everything necessary for an ordinary water-gas plant, and could get an 8-candle gas from a generator, this would treble the value of the oil used—simply using their own gas with the tar. There must be a wonderful field for that; and the paper was a very suitable one for an Association of members connected with works of small size. The system was one that he had had pigeon-holed for a considerable time, with the intention of considering it more deeply before taking the plunge into the question of using it. He was greatly impressed by the experiments made by Mr. Tully at Sligo; and, as it struck him (Mr. Anderson), he seemed to have in his water-gas plant advantages which no other plant possessed. The taking off of gas at a practically constant position was a matter of great advantage. Having a varying depth in the generators must be a great disadvantage. But, if he did not err, Mr. Tully entered upon his investigations owing to a lecture delivered by Professor Lewes, in which it was shown that acetylene could not be used for enriching coal gas, but that a gas rich in methane would have a carrying power which the other gases

they were familiar with had not. He would like to know from Mr. Tully if he had proceeded at all in this direction. The original idea of the whole thing was to enrich by acetylene; but he saw that apparently no results had followed from the idea—whether due to the cost of acetylene or not, he could not say. It seemed to him that this primary object had been absolutely overlooked. He would like Mr. Tully to tell them why 8-candle power was the limit. In this country people were accustomed to be supplied with gas from 24 down to about 14 candles; and he was afraid that if they were to ask them to put their name to 8-candle gas they might hesitate. He had no doubt that experiments were being made to ascertain where the tar should be injected; and on reading the paper it seemed to him that the places indicated were not altogether suitable. He should think that they should put in the tar where there was great heat. But it seemed to him that some of the tar was injected when the fuel became cold; and he was afraid that they would have the tar volatilized to some extent, and a portion carbonized, and that they would not succeed in the cracking-up which was necessary to produce permanent gas. A strong point was made in the paper that the tar not carbonized was used for fuel. It depended on the comparative prices of tar and coke whether or not it was profitable to use the former for fuel. The President had referred in his address to his making experiments in the burning of tar. If they were selling tar at 1½d. per gallon, and they got £1 per ton for coke—the prices he was realizing at present in the South—he could only form the opinion that it did not pay to burn tar.

The PRESIDENT: We are only getting 1d.

Mr. ANDERSON thought it was a point well worth considering, even if they only got 1d. for tar; but his opinion was that he would rather burn his tar if they did not get more than ¾d. per gallon for it; and he was not without considerable experience in the burning of tar. In their works they used to burn it successfully; but there had been considerable improvements in retort-furnaces, with the result that they no longer liberated so much coke for the same quantity of tar. Even in small works the introduction of gaseous firing had made the burning of tar unprofitable. The tar-furnace used to be, comparatively speaking, a perfect one. If they analyzed the gases from it, they found them very perfectly burned; whereas in the coke-furnace they had enormous waste. But the tar-furnace seemed to have produced comparatively perfect products of combustion. He did not think it would pay to attribute any value to the burning of tar as fuel. He understood that at Truro they were using both tar and oil for carburetting purposes. This seemed to him to be the introducing of considerable complication, as they already had a set of pumps for oil, which would have to be duplicated if tar were used; and it was a pity to have another set of pumps working.

Mr. WHIMSTER said it seemed to him that the process described was involved in a great deal of mystery; he did not understand it. The illustration which accompanied the paper seemed to him to be the ordinary one of a carburetted water-gas plant. They had a generator, a regenerator, a superheater, a scrubber, and a condenser, altogether complete. But it appeared to him that they were using tar instead of oil to carburet the water gas; and the tar employed only produced 8-candle gas, whereas with oil they could get up to any illuminating power they pleased. He did not see what benefit the 8-candle gas would be to them. It would bring the gas down considerably, which would not please their consumers, because they were not all using incandescent mantles yet. He should like Mr. Tully to give them more explanation about the process, and what it led to, than was contained in the paper. Why they should make an 8-candle gas to enrich a gas of 16 or 17 candles, seemed a mystery to him. He came to the conclusion long ago, from experience and experiment, that tar was worth 2d. per gallon to burn, under the old system of direct firing. But they would need to be getting a considerably less price than this for it to warrant them in beginning to have the trouble and the anxiety connected with tar-furnaces. He thought that, with the regenerative appliances they now had, the consumption of coke was so low that tar would not be worth so much to burn; and he did not know how it could be burned with the furnaces they had—it would be very apt to choke the flues and small passages. He got 20s. per ton for his coke; and he sold his tar for 3d. and 4d. per gallon, and for the surplus tar 2d. per gallon. He had a good demand for coke, and he could do very well with the burning of tar, if he could afford it. But as to turning it into gas—by the process described—well, he could not say. He had not seen the process at Truro, and he could not say that he understood it; and he did not like to condemn a thing he did not thoroughly understand.

Mr. T. J. REID (Ballina) said the process described in the paper had attracted a considerable amount of attention, and they had all been buoyed up with the hope that they would arrive at some sort of plant that would be suitable for small gas-works. They must all congratulate Mr. Tully, and those associated with him, on the success he had attained at Truro. What he (Mr. Reid) would like to know was how the plant was to be operated in small works. They were not all in the happy position of getting 2d. per gallon for their tar. In the North of Ireland it came to about ¾d. per gallon. At this price it would certainly pay to burn it. So that if the methane-hydrogen plant could be got in such small units or would suit works of their size, money would be well spent in its erection. It would also be useful in staving off the evil day when they would have to enlarge their plant. He should like to know how the plant could be erected commercially—whether, apart from its being cheaper than coal-gas plant, it would act as a stand-by.

Mr. R. G. SHADBOLT (Grantham) said he had seen the illustration, and had followed, to a certain degree, Mr. Tully's experiments and their results; and he could only hope that he might go on and prosper. It would be certainly to the advantage of many undertakings to burn their tar if they could not get a better price than they were doing by selling it.

The PRESIDENT remarked that if they looked up the back numbers of the technical publications they would find photographs of processes for the working-up of gas residual products. He had the pleasure of seeing a test made of the plant, and it confirmed, almost to a decimal, the figures given by Mr. Ingram. What he looked to, as the future of gas, was a future of power and fuel gas; and unless gas companies were prepared to cope with gas manufactured of high calorific value and of low price, their day was going to be short, because, in his opinion, producer gas was the thing of the future. They had already the suction producer for gas-engines; and they could not get over the fact that this gas could be used for heating. It was used for power purposes, and it could be used for heating purposes by simply having the apparatus in the yard, and leading it into the house.

Mr. TULLY, in closing the discussion, said that in regard to the 8-candle gas mentioned in the paper, it referred to the gas made at Truro. In the plant mentioned in the paper, it was proposed to adapt the methane-hydrogen generator to the carburetted water-gas plant and to carburet the gas. This meant that they would be able to produce gas of practically any illuminating power they required. This would be with tar and oil; but with tar alone, he expected to get about 12-candle gas. With reference to 8-candle gas in the Truro plant, they had not yet succeeded in introducing more than sufficient tar to make gas of that quality; but they hoped to increase the quantity. It might be considered of far greater advantage to use tar in the generator, and get the advantage of the hydrocarbons in it, than to burn the hydrocarbons in the generator setting. But, of course, they got the benefit of the heat of the tars, and not only that, but of certain of the hydrocarbons in them. In this plant, any oil not used up in the carburetted water-gas plant could be returned to the generator and carbonized. With respect to Mr. Whimster's remarks, they did not send out 8-candle gas, but mixed it with coal gas and carburetted it up to the power they required. With the addition of 20 per cent. of methane-hydrogen gas to coal gas, they got a 16-candle gas; and they found that with this mixture no benzol was required. They introduced the 20 per cent. as a constant mixture through the hydraulic mains. In regard to Mr. Reid's observations, they had a plant of 50,000 cubic feet capacity per day—about 3000 cubic feet per hour. This was practically the smallest plant supplied. When he was at Truro a few weeks previously, he was interested in the arrangements Mr. Ingram was making. In order to forestall the suction gas-producer, he had decided to run to one section of their district, where there were a large number of gas-engines, a special power main from the methane-hydrogen plant; and they were now engaged on the work. For some little time he had been experimenting with a gas-engine, to ascertain the relative value of methane-hydrogen gas compared with ordinary coal gas; and the conclusion he had come to was that by supplying methane-hydrogen gas with but little, if any, enrichment, they could afford to sell gas of 350 to 400 B.T.U. at about half the cost of coal gas; and by this means they should be able to keep out other producer plants. This also opened up to them another question—viz., where they had not to consider the illuminating power, there were a number of cheaper forms of enriching spirit which, while they became costly for enrichment for illuminating purposes, were very much more effective for enrichment for calorific value than benzol. They would shortly have these two methods of enrichment—one for calorific value and the other for illuminating value; the former on the methane-hydrogen main and the latter on that conveying the mixed gases as they entered the holder. Another point also it might be worth while to touch upon, and that was that with benzol enrichment pure and simple, in order to maintain a good heating value of (say) 600 B.T.U., they had to supply gas of about 17-candle power, even when tested by the rational method—*i.e.*, by a 3½-inch flame; whereas if they first of all enriched the methane-hydrogen gas with a spirit of high heating value, they would require but little enrichment by benzol for illuminating power, even with their heavy mixture of 40 per cent. of hydrogen gas. Mr. Ingram explained that by using heavier oils instead of benzols he could bring up his calorific value.

Mr. WHIMSTER said he was sorry Mr. Tully had not explained this before, because it just fixed the point of his remarks. If he had told them he was introducing the 8-candle gas into the hydraulic main, that accounted for the whole thing. It was Professor Lewes's idea with ordinary "blue" water gas. Anyone could see that it was possible to mix 20 per cent. of 8-candle methane-hydrogen gas with 80 per cent. of 8-candle coal gas and not reduce the illuminating power.

According to a recent consular report, the principal centres of the calcium carbide industry in France are in the Alps and Pryenees, particularly in the environs of Bellgarde, Grenoble, Nice, and Toulouse. At present there are 11 manufactories, capable of producing 40,000 tons of calcium carbide annually.

A MODERN SULPHATE PLANT ADAPTED TO A SMALL GAS-WORKS.

By C. B. Outon, of Inchicore.

[A Paper presented to the Irish Association last Tuesday.]

It has been suggested to the writer that a detailed description of the sulphate plant erected at the Great Southern and Western Railway works, Inchicore, together with a short account of the objects and method of working, would be acceptable to several members of our Association who have not hitherto treated the ammoniacal liquor produced at their works, and that others who already have stills of one form or another might note some few slight points of divergence in working which, perhaps, would prove of interest to them.

The object aimed at in every form of still is to expel the ammonia, chiefly by the agency of heat; and Lunge's "Treatise" (p. 177) gives a clear indication of the most economical method of heating. In a working experiment, conducted by Dr. Tidy, we are informed that he dealt with 7000 gallons in each of three trials, with the following results:—

	Duration of Distillation. Hours.	Yield Compared with Theory. Per Cent.
When heated by open fire from without . .	22	90·0
,, ,, indirect steam (in a coil) . .	18	92·0
,, ,, open (wet) steam . . .	14	98·5

This afforded a clear proof that steam blown directly into the liquor was the best and most economical form of working; and its higher efficiency is ascribed to the steam mechanically carrying away the ammonia.

Accordingly, you will notice in the plant to be presently described, that the designers have adopted the third method of heating, for the purpose of obtaining the maximum efficiency in the consumption of fuel. As a portion only of the compounds of ammonia—including the carbonates, sulphides, and cyanide—have their ammonia expelled by prolonged boiling, it is necessary to employ some reagent to decompose the remaining compounds, containing the sulphates, sulphite, carbonate, chloride, sulphocyanide, and ferrocyanide. Milk of lime is invariably employed for this purpose; and its use increases the yield of ammonia from 15 to 20 per cent., which would otherwise be lost in the effluent liquid.

One of the most important points to be remembered is to aim at the almost complete separation of the tar from the liquor by settling; any introduction of the former into the still giving rise to complications of back-pressure produced by the partial decomposition of the tar. We are all aware that liquor, as it flows from the hydraulic main, condensers, and scrubber, is charged with tarry particles, some of which are dissolved in the water, while the greater portion are in a state of suspension. These should be separated by settling. In our own case, the suction pipe of the force pump which elevates the liquor into the overhead supply tank is capable of being raised or lowered to different levels, to ensure its being kept over the zone of the tar-level within the well. This pump is driven off the shaft of our Clapham washer-scrubber, and performs the double duty of supplying liquor to the vertical scrubber and also to the supply tank of the sulphate plant.

Our sulphate-house is 26 feet by 19 feet by 16 feet (in height), and is provided with a superheater, free still, lime leg, and fixed still, each of which is 2 ft. 6 in. inside diameter and 6 ft. high; and also a saturator, 4 feet by 3 feet by 3 feet. The general plan is shown in sketch, p. 500. It will be observed that provision is made for storing 12 tons of salt, across the width of the house, together with mother-liquor and acid tanks, lime mixer, &c.

The supply tank is raised to a height of 3 ft. 6 in. over the top of the free still, in order to overcome the pressure of the evolved gases, which are subjected to the seal of the saturator and any back-pressure of the purifier. The liquor is first led through a 1½-inch coil of lead pipe within the superheater, and thus absorbs a large proportion of the heat from the saturator outlet gases prior to their final condensation and absorption. The liquor is then conveyed to the free still, shown in section, which is provided with nine trays, each containing nine hoods with serrated edges, and fitted with a 2-inch overflow and mid-feathers so arranged as to afford a large amount of travel in each tray.

I have already referred to the introduction of tarry particles with the liquor; and these loose trays form the special feature of this still, as affording an easy and accessible method of removal and re-erection after cleaning, without going to the usual trouble of having to remake the joints of sections of the entire still.

The lowest tray is provided with a 2-inch outlet, reaching almost to the bottom of the lime leg; and into the latter milk of lime is introduced and constantly agitated by means of a steam supply. The liquor then overflows to the fixed still, through the connecting pipe; and the base of this still is also provided with a second steam admission for the completion of distillation. The effluent liquid is then conducted to a water-seal, 12 feet in depth, which forms a safe means of ensuring that the pressure within the still shall not exceed that afforded by this depth. Accordingly, the fixed leg steam supply has to overcome the sum of the seals of the trays in both the free and fixed stills, the depth of the acid in the saturator, and any back-pressure of the purifier. The steam supply to the lime leg is so adjusted that there are equal pressures on both sides of the connecting pipe leading to the fixed still, when the height of the liquid within the lime leg will always be on a level of the connecting pipe. This is indicated by a water-gauge column. Both legs are lagged with wood, to reduce undue radiation of heat.

The milk of lime is prepared in a tank in the corner of the sulphate-house, and is introduced in a very finely divided state by being allowed to sieve through a sack of coarse mesh. It is forced into the lime leg at intervals by means of a small steam injector.

The gases issuing from the fixed still travel to the base of the free still through the overflow pipe, and unite with those evolved from the free still and are carried, by means of a 2-inch supply, to the saturator. These gases consist principally of ammonia, steam, sulphuretted hydrogen, and carbonic acid; and when the temperature of the saturator exceeds about 200° Fahr. the first is alone absorbed, while the others pass on for condensation and absorption through the waste-gas pipe to the superheater and there give up a large proportion of their heat, by raising the temperature of the incoming liquor. A 4-inch outlet from the superheater is then led to a suitable syphon, and through a number of 4-inch pipes, forming a condenser; and, finally, the outlet of the latter is connected to an open oxide of iron purifier. The condenser pipes are sloped, with a fall towards their inlet, instead of towards the outlet. This is done to enable the "devil" water to be removed at a higher temperature, in which state it contains a less percentage of sulphuretted hydrogen than it would do if taken off the outlet. The unpleasant smell of the condensation is thus very largely reduced.

The saturator is made 4 feet by 3 feet by 3 feet, with 1-inch sides and curtain and 1½-inch base—constructed of pure lead. It is provided with an overhead acid supply tank, which is fed by a Regulus metal acid elevator, worked by steam; and so the labour is reduced to a minimum. Provision is also made for a suitable sloping drain, 3 ft. 6 in. square by 15 inches deep, lead lined, while the sulphate store, 19 feet by 5 ft. 6 in., is also lined up to a height of 5 ft. 6 in.

I have brought with me an average sample of the salt produced. The salt has been repeatedly tested and found to contain over 25 per cent. of ammonia. Not the slightest difficulty is experienced in its disposal for sale.

Some blue discolouration of the salt occurred occasionally during the earlier working of the plant, which, however, did not detract from its commercial value. The cause has been carefully investigated and found to be due to the acid in the saturator being allowed to become over-neutralized and alkaline. This was followed by the addition of more acid to bring it back to its former state. The ordinary reaction in the manufacture of sulphate, as you are aware, is represented by

$$2\,NH_3 + H_2SO_4 = (NH_4)_2SO_4.$$

With these substances in a pure condition, we should have little trouble; but commercial acid invariably contains more or less iron salts in solution as impurities.

The vapours from boiling liquor contain ammonium cyanide, which does not affect the sulphate in the presence of acid solutions, but reacts with sulphuric acid, with liberation of hydrocyanic acid and formation of ammonium sulphate—

$$2H_4CN + H_2SO_4 = (NH_4)_2SO_4 + 2HCN.$$

If, however, the ammonia passes into the saturator until all the acid is neutralized and then becomes alkaline, a reaction immediately takes place between the ammonium cyanide vapours and the iron salts (impurities in the acid), and ammonia ferrocyanide is formed thus—

$$\underset{\text{Ammonium cyanide}}{6\,NH_4CN} + \underset{\text{Ferrous sulphate}}{FeSO_4} = \underset{\text{Ammonium ferrocyanide}}{(NH_4)_4Fe(CN)_6} + \underset{\text{Ammonium sulphate}}{(NH_4)_2SO_4}.$$

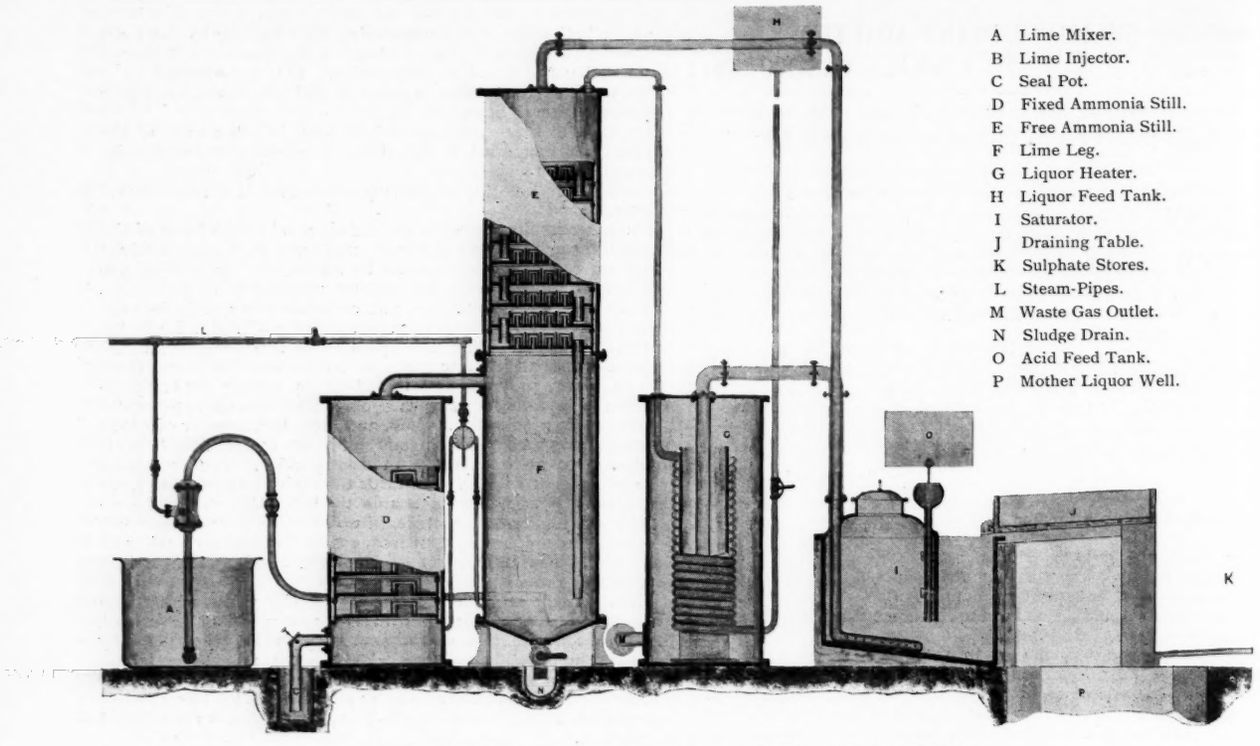
If more acid (containing iron) be now added, the ammonium ferrocyanide will combine with the iron and form prussian blue; the reaction being represented by—

$$\underset{\text{Ammonium ferrocyanide}}{3\,(NH_4)_4Fe(CN)_6} + 2\,\underset{\text{Ferric sulphate}}{Fe_2(SO_4)_3} = \underset{\text{Prussian blue}}{Fe_7(CN)_{18}} + \underset{\text{Ammonium sulphate}}{6\,(NH_4)_2SO_4}.$$

The prussian blue remains unchanged by the acid and colours the sulphate; a very small amount being required to tinge a large quantity of sulphate. In order to prevent the formation of blue sulphate, the attendant needs to keep the saturator properly supplied with acid; in other words, he must not allow the ammonia to pass until the acid becomes alkaline. A plug should be fitted on the waste-gas pipe leading from the saturator, and the gases tested at intervals with litmus paper. The gravity of the acid should be occasionally sampled, to see that the strength is maintained. As a rule, the blue salt is formed during fishing time, owing to the saturator being then weakest in acid.

In the case of acids containing arsenic, discolouration of the salt also occurs owing to the formation of arsenious sulphide; and I understand that some sulphate makers introduce a small quantity of tar, and also mineral oil, in the saturator for the purpose of accelerating the removal of the arsenious sulphide, and to facilitate the formation of the scum, which can be easily skimmed off, leaving the white sulphate behind.

When sulphate manufacture was first commenced, I should have been greatly assisted by a set of simple instructions for the



THE SULPHATE PLANT AT THE INCHICORE (DUBLIN) GAS-WORKS.

guidance of the attendant; and accordingly I have prepared a few rules which may prove invaluable to any of you about to start this work.

(1) The free and fixed stills are to be first thoroughly heated by turning on both intermediate steam cocks, and the plug on the top of the free still is to be left open until steam freely issues. [The object of this is not to unduly dilute the acid in the saturator by excessive condensation.]

(2) While this is proceeding, fill the acid and the elevated ammonia water supply tanks. Examine the oxide of iron purifier, and see there is no hard caking against the grids, inattention to which would produce back-pressure. Add acid to the saturator until about two-thirds full. The gravity of the mixture must not be less than 75° Twaddel.

(3) Next, turn on the liquor supply cock; the proper position being indicated by a pointer on the plug being turned opposite a notch.

(4) The level of the liquid in the lime leg should be on a line with the bottom of the pipe connecting it to the fixed still. Should the level get too high, it may be adjusted by partially opening the steam supply cock leading to the "free" still. Should the level get too low, it may be raised by slightly opening the steam supply cock leading to the "fixed" still. [The object of this is to equalize the pressures at the tops of the fixed still and the lime leg, as previously described.]

(5) During the manufacture of the salt, the inlet pipe to the saturator should be frequently handled, to detect whether the heat is being maintained. Should the pipe at any time get cool, the liquor supply cock should be at once turned off, and a little more steam turned on to quickly heat it up again. The wooden plug in the supply pipe should be frequently partially opened, to make sure that the ammonia is coming off freely.

(6) During the run the gravity of the acid must not fall below 54° Twaddel. [The object of this rule is to prevent the formation of blue salt.]

(7) The lime agitator and injector should be worked every quarter-of-an-hour, and a quantity of milk of lime injected.

(8) When shutting off, turn off the ammonia liquor supply and the two steam admission cocks half-an-hour before leaving.

(9) Before going away, admit some strong acid to the saturator and remove the wooden plug from the ammonia supply pipe.

The object of the first part of the last rule is to re-dissolve any sulphate which would crystalize out in the cooling of the saturator and tend to clog the holes in the ammonia supply pipe in the saturator, while the removal of the plug prevents the formation of a partial vacuum in the inlet pipe to the saturator, produced by the cooling of the free still, and thus saves the clogging of this pipe by the sulphate. Everything is then in perfect readiness for the next run.

Coming now to the financial aspect, I have made careful records during the half year ended June 30. I find we have distilled 186 tons of liquor, and used 14 tons 10¾ cwt. of acid at £2 5s. per ton, in the production of 18 tons of sulphate, or a trifle over 16 cwt. of acid per ton of salt. The total cost of the acid was £32 14s. 2d. The labour, including loading into sacks, cost £10 5s. The cost of fuel amounted to £16 4s.; the extra steam being produced by the combustion of 18 tons of coke, which was charged at 18s. per ton. In this respect, we are higher than we should prefer; and this figure might be much reduced by utilizing the small breeze by the aid of a forced blast, which we do not at present possess. Our exhauster and washer-scrubber are steam-driven, and the fuel charged represents the exact difference required when the sulphate plant was in action. I think perhaps the actual balance-sheet for the past half year will afford the best evidence as to the valuable asset we have in sulphate making:—

To wages, making		£10	5	3	By sulphate (18 tons at £12 10s.) £215 0 0
,, ammoniacal liquor (at 5s. per ton, the price formerly obtained)		46	7	8	
,, coke		16	4	0	
,, sundries		0	11	11	
,, lime		1	7	0	
,, acid		32	14	2	
,, repairs, wages, and materials		3	12	6	
		£111	2	6	
Profit in half year		103	17	6	
		£215	0	0	

The profit might be subjected to depreciation of plant and cost of registration fee—say, £10 in all; and the difference then shows a very respectable interest on the original outlay.

I would again remind the members that the foregoing remarks have been prompted by a desire to give a few hints to any fellow members who are thinking of distilling their ammoniacal liquor, instead of selling it or allowing it to run to waste. I ought not to forget to add, in conclusion, that the plant just described was erected by Messrs. Biggs, Wall, and Co., under the direction of their Assistant, Mr. C. B. Tully.

Mr. OUTON, before the discussion was proceeded with, added to the paper the following passage: I have been thinking that I might have mentioned, speaking generally, that, in reference to the saturators, you may notice that I have described my own as being made of 1 inch thickness and 1½ inches base; and I think that these figures should be, as far as possible, adhered to. The thinner sections give rise to repeated leakages, due to uneven expansion and contraction. I have not had sufficient experience in this matter to say—in fact, I feel somewhat diffident in bringing a paper of this nature before you—but I am led to believe that a saturator of the thickness I have mentioned should stand some fifteen years. Then with regard to the stills, I have been thinking that even in this, which I consider is one of the most up-to-date stills, finality has not been altogether reached, because I notice that no attempt has been made to absorb the heat of the effluent liquid. I think there is a great deal of heat running to waste there. I believe that in large places they utilize this heat

in raising that of the feed-water to the boiler. The diagram is what I would call a diagrammatic one, inasmuch as it does not actually represent the details, to the effect that, for the purpose of illustration, all the parts are brought into one plane. We expected to have had an outside view; but, through some mistake, it has not been sent here. You will all have observed, however, that it has been illustrated in the advertisement columns of the "JOURNAL OF GAS LIGHTING."

Discussion.

The PRESIDENT (Mr. G. Airth, of Dundalk) said that perhaps some of the members who were not interested in carburetted water gas or methane-hydrogen gas would be in the subject of the paper, which was one of importance to Irish gas managers. It had been brought before them on a previous occasion, but he did not think in anything like so exhaustive a manner as Mr. Outon had now presented it.

Mr. J. G. TOOMS (Waterford) did not think there was very much, if anything, of a controversial nature in the paper. One point that struck him, looking at the diagram, was that, if it were made to scale, the superheater seemed to be very small; and this, in relation with the latter part of the paper, he should imagine would account for the very high fuel account per ton of sulphate made. They would observe that to make a ton of sulphate required a ton of coke. The usual quantity of fuel to produce a ton of sulphate was, he thought, somewhere about 10 cwt.; and perhaps this might be the reason that, in Mr. Outon's case, the fuel had been found so large an item. He should like to ask Mr. Outon the capacity of the plant, in sulphate, per 24 hours. With reference to the agitator, or injector, the author informed them that he had it worked every quarter of an hour. He (Mr. Tooms) presumed it would be worked for a few minutes. Could they not have an injector sufficiently small to keep it working continuously? How often, during the period of six months, did the author make sulphate of ammonia? If, as he understood, Mr. Outon had considerable storage for liquor, the fuel account was very high; but if he had only limited storage, so that he was obliged to make a small quantity of sulphate every time he heated up the plant, of course there was a good deal of loss, due to starting it when cold, and to losing the heat which the plant contained when he had finished making sulphate; whereas if he could start and work up a month or two's liquor in one continuous operation, there would be considerable saving in the fuel used. He could not find in the paper how much coal Mr. Outon carbonized; so they could not make out the quantity of sulphate he got per ton of coal. He (Mr. Tooms) was ready to admit that, even if small, this might not be altogether due to the sulphate plant, but to the scrubber not being sufficient. His own make of sulphate per ton was much under the average; and, notwithstanding this, there was no trace of ammonia in the purified gas sent to the holders. Yet for last year he thought his make of sulphate per ton of coal was only 17·6 lbs.; whereas they really ought to have had 22 or 24 lbs., under ordinary circumstances. In looking round to discover the cause of the small make, so as to be sure that the plant was all working efficiently, it occurred to him to have the tar analyzed. At the time he happened to have the assistance of a fully-qualified chemist in his works. The result of having the tar analyzed went to show that there was equivalent to 14·6 oz. of sulphate in a gallon, which would account for more than the difference between what they ought to get and what they did get. The tar was particularly thick; and it was found that, though the sample taken appeared to be pure, it yielded this quantity of sulphate. To the plant as originally erected he added a superheater, which effected a considerable saving in the fuel account. The waste gases now went away from the condenser at a very low temperature.

Mr. WHIMSTER expressed some doubt as to the accuracy of the figures relating to the yield of sulphate.

Mr. R. B. ANDERSON (London) said that, taking 10 gallons—and they hardly ever got this quantity of tar from Newcastle coal—it worked out at 17 lbs. of sulphate. About 24 lbs. was the best they had ever obtained from Newcastle coal. With respect to sulphate plants generally, he thought it was a question of the size of the works as to what type of plant they were to introduce; and there were two considerations which affected one in coming to a conclusion on this subject. The first was as to the initial make, in small works—making (say) 5 million cubic feet per annum. In such a case they could not afford to spend too much money upon plant which they would use very seldom, and for so small a quantity, as the wear and tear of chemical plant of all sorts was very considerable; and there were a lot of connections which required attention. If they were keeping the plant going continuously, it would probably go on all right; but it was very different if they were only using the plant for a day or so every couple of months. Another point, which was indeed more important, was as to the amount of labour which had to be given to the working of the sulphate plant. Mr. Tooms had raised the point of the injector having to be attended to every quarter of an hour. This would prohibit the use of such a plant in small works. The difficulty would, of course, be obviated by putting on a small injector. But then, apart from the pump, they had the saturator. In small works they might have difficulty in keeping up the heat of the saturator. In works of about 40 millions, it was better to put in a close saturator and evaporator than to use a fishing saturator. If they put down a still externally heated and a saturator of the ordinary type, they could charge up the saturator and saturate the whole, and then all they had to attend to was the furnace. In small works, their wages would be low; and then, during the daytime, it would be the work of perhaps half-an-hour to run off the evaporator. They could evaporate during the day and distil at night; but this was always subject to their having men to give attention to the plant for an hour in the morning and evening. It required no attention during the rest of the time. This was a consideration in small gas-works.

Mr. W. H. ROBERTS (Newtownards) asked if any difficulty was experienced in getting rid of the liquor. The last time he was making sulphate, he ran a lot of liquor into the well again. He did not know whether this was doing well or ill; but he did not get any bad results, and he intended going on. He had an exceptionally large saturator, and he only fished it once in five or six hours. He had no trouble with the mother liquor gathering—in fact, he had often to put in two or three buckets of water. It was a continuous plant. When he went to Newtownards, it was an intermittent system; but he could not really recommend it. About £50 worth of sulphate a year was all they could sell; and they had more than four times this quantity now with the new plant. He saw that in Hamilton they had a new type of saturator, with a vacuum; and that they got 35 lbs. of sulphate per ton of coal. Another thing which he might mention—he had been doing it all the summer, but did not know how it might answer in winter—was that he was now using oxide in the ordinary gas-purifiers; and he had been sending his waste gases from the sulphate plant right into the hydraulic main, and through it. Mr. Tully's remarks led him to understand how his quality had not come down. He had really shut off his purifier altogether now. He had not used it for, perhaps, five or six months; and he had not experienced any inconvenience. He used a small quantity of lime for purification, because he found he did not need much.

Mr. WHIMSTER said Mr. Roberts had raised a very important point; and he thought he should give them some information by and bye as to the result of the process, because it seemed to him to be a very dangerous one. He would not like to risk it.

Mr. ROBERTS replied that he had a check-valve, and that practically the one was sealed from the other.

Mr. T. FRIZELLE (Holywood) had had experience with both intermittent and continuous sulphate plant. When he worked an intermittent plant, he got 18 lbs. of sulphate per ton of coal carbonized. After he obtained a continuous plant, he made 25 lbs. There was considerable difference between the two makes, and therefore he would not recommend anyone in a small works to purchase a poor plant. He should get one of the best and most up-to-date plants, and he would have less trouble with it. He wished to point out that the lime injector might give trouble, because the lime was sure to cake with the heat of the steam. He had a pump, and he had gauged the flow of liquor into the still, and also the quantity of lime he required; and so, every fifteen or twenty minutes, a man pumped for so many minutes. He himself occasionally tested the waste gases. He would be afraid that the injector would not go right. Otherwise, the plant was not very much different from the ordinary run of continuous sulphate plants, with the exception of the superheater. If he read the paper aright, the superheater was a lead coil, which the liquor ran all through. He bought a 3-ton plant, and he did not like the superheater, so he asked the contractors to give him a superheater suitable for a 5-ton plant; and he found that this was very much better than the one which was usually sent out. He had a steam coil round the inside of his saturator. He raised the liquor in the saturator up to boiling point, and drove the steam through the still, bringing the whole thing up to boiling point, and then ran in the liquor. He stored the liquor about a month, and then they worked night and day for about a week; and he had not the slightest trouble. He started the saturator at a strength of 68° or 70°, brought it down to 54°, and filled up again; and there was no trouble. Sometimes the liquor was 8° Twaddel; sometimes down to 5°. He made about 20 tons of sulphate a year.

Mr. D. W. TOOMS (Fermoy) said he distilled the liquor over into a lead tank saturator, which was, comparatively, an inexpensive plant. He was able to get 20 lbs. of sulphate of ammonia per ton of coal. He did not know that the manager of a works under 20 million cubic feet was justified in getting a continuous plant. He had not the slightest doubt that such a plant would be more efficient than the one he was using; but he was of opinion that for works producing less than 20 million cubic feet an intermittent plant was to be preferred.

Mr. R. G. SHADBOLT (Grantham) said that he would like to ask a question with reference to the strength of the liquor, as Mr. Tooms had asked about the make of sulphate. He thought, if he interpreted the meaning of the paper aright, that it was not so much a question of continuous *versus* intermittent processes as a means of showing those managers who had works of certain sizes, and who were not working up their liquor, how they might do it economically, and how they could make it pay. No doubt Mr. Outon would be sufficiently rewarded if some of the members were induced to put down plant which would increase the value of their liquor two-fold, and in some cases three-fold.

Mr. T. J. REID (Ballina) asked what size of plant or what size of works would justify the starting of sulphate plant, whether it were intermittent or continuous.

Mr. F. EUSTACE (Tullamore) said his Directors had placed an

order for a sulphate plant of the same style as that before them, and he hoped that, by next meeting, he would be able to give them some information as to its working.

Mr. OUTON said he felt immensely flattered by the very kindly remarks they had all made in regard to his paper. The sample of sulphate before them was made on the previous day. It was not quite dry, and he considered it a fair sample of what he had been making during the past year. The sulphate had been repeatedly analyzed; and it averaged about 25·2 or 25·3 per cent. of ammonia. As to the fuel account, he fancied Mr. Tooms must have made a slight error about the number of hundredweights of coke that he was enabled to produce per ton of sulphate. He had gone into these matters most carefully, and measured the difference in the coke used in the boilers. He had boilers of good efficiency, with connecting pipes carefully lagged, so that there was no undue radiation; and he had not been able hitherto to get much below the figure quoted. He was inclined to think there was some slight technical error, and that it should have been 18 cwt., instead of a ton, of coke, but he would take care to correct this in the final issue. He could not possibly have obtained the result Mr. Tooms had mentioned, which was a very low figure —something like one-half of that quoted. The capacity of the plant per twenty-four hours was taken at 5 tons of liquor; and they could comfortably obtain a good half-ton of sulphate per shift of each man—that was, in the twelve hours. This was the average production. He thought Mr. Tooms's hint in regard to a continuous injector was remarkably good, and he should take steps during the next winter or two to adopt it. He thought the idea of a small continuous injector would save constant attention on the part of the attendant; and as they could not be there always themselves, it would ensure that the thing was working correctly. With regard to storage, he regretted to say that up to the present time he had not got sufficient storage room to work in the continuous way which he believed to be so beneficial. He hoped to improve upon his present storage, and that very shortly, because he felt sure that it would be an advantage, on the one hand, to store and thus save loss by repeatedly heating up the plant. The quantity made per ton of coal, unfortunately, he could not state, because he had not come fully prepared to give it as a definite figure; but, from his recollection—he would correct that, too, in the final issue—it turned out as about 24 lbs. per ton of coal. They were not labouring under the conditions mentioned by Mr. Tooms with regard to the scrubbers. He had a good vertical scrubber, and then, at the outlet, a rotating platform washer; so that he extracted the whole of the ammonia from the gas, and it finally was practically clear water. Mr. Roberts asked where they sent the effluent to from the last vessel. Well, they ran it to a distant ash field, and it gradually percolated through the ground; and as it was some distance from any stream, they had no trouble whatever. One gentleman struck the right key-note as to his chief object in bringing forward the paper. As most of them were aware, his work carried him over the southern half of Ireland; and in that capacity he had perhaps very often, on puzzling his brains at their respective gas-works, thought of bringing a paper of this nature, which would prompt members to consider as to whether it would not be advisable to set up a small plant of their own, and so increase their returns, or their companies' returns instead of—what was being done in many cases to get rid of it—having to pay for its removal. With regard to the minimum size of works, that, of course, would depend upon local conditions; some of them might not be so well situated as he was, being stationed on the outskirts of Dublin. They would have to consider the cost of the freight. But in the paper he believed he had given sufficient and full information which would enable each one to judge of his capacity to produce sulphate, profitably or otherwise. In his own instance at Inchicore, they were only getting 5s. per ton for liquor—they were only getting the £46 which was mentioned. The whole of the expenses were put in the table in the paper; and it would be seen that they were getting an additional profit, over and above, of £103, from which he suggested that they should knock off, for depreciation, £10. He was trying to see whether he could avoid mentioning anything about the cost. This was not his province. So far as he could judge, however, the interest upon the cost of the plant amounted to 40 per cent., and he left it to them to judge whether it would be a profitable investment or not. One member asked him as to the strength of the liquor. Well, of course, this varied. They got it at one strength from the condenser, another from the scrubber, and yet another from the washer. The earlier portions of it would be of a strength up to 8° Twaddel, and even 9° or 12°; but he should say the average strength would be 5½° to 6°.

Gas-producer regulations have been issued by the National Board of Fire Underwriters in America. Pressure systems must be located in independent buildings; but suction producers up to 250-horse power may be placed in a separate enclosed, well-ventilated room in any building where the natural light is good. While the plant is not in operation, the connection between the generator and the scrubber must be closed, and the connection between the producer and the vent-pipe opened, so that the products of combustion can be carried into the open air. This must be accomplished by means of a mechanical arrangement which will prevent one operation without the other. If illuminating or other pressure gas is used as an alternative supply, the connections must be so arranged as to make the mixing of the two gases or the use of both at the same time impossible.

AMERICAN ELECTROLYSIS INVESTIGATIONS.

The phenomena connected with electrolysis are watched with unusual interest in the district containing the mains of the Metropolitan Water and Sewerage Board of Massachusetts; and in the report of the Chief Engineer (Mr. F. P. Stearns) for the past year some particulars are given on the subject, which are reproduced in "Engineering Record." He states that investigations relative to the injury to the pipes caused by stray current from the street railway systems were continued throughout the year. In the annual report for 1903, some detailed descriptions were given of the injury done to 48-inch pipes in Cambridge, 24-inch pipes in Chelsea, and 12-inch pipes in Lynn; and also of an experimental test of an insulating covering of asphalte and burlap which was being made by the Boston Elevated Railway Company. On April 6, 1904, this covering, which was applied in November, 1902, was removed from one length of 48-inch pipe for the purpose of examination. Before the covering was applied, the pipe was carefully cleaned, and the pits dug out and located. Upon removing the covering, many new pits were found; and in some cases there was one large one where there were two or three separate pits before the covering was put on. The number in the pipe had increased from 80 in 1902 to 496 in 1904. The railway engineers suggested that possibly the pits were not all dug out before the pipe was covered; and they therefore covered it again for a further test. They have since made the following experimental tests, which indicate that the covering has little, if any, value under some circumstances.

A short piece of 4-inch pipe, covered in the same manner as the large pipe, was buried in dry earth in a box, and a cast-iron plate was put in 15 inches from the pipe. In one test tar was used in the covering, and in another asphaltum. The pipe and plate were connected in the regular trolley circuit of 500 volts. While the earth was dry, the resistance between the pipe and the plate with the tar covering was 700 megohms, and with the asphaltum covering 34 megohms. The earth was then saturated with salt water, and the resistance quickly diminished, and after seven to ten days it disappeared.

For the purpose of reducing the injury which was being done to two lines of 36-inch pipe crossing under Charles River near the power station of the Boston Elevated Railway Company in Cambridge, two 48-inch insulating joints were set in July, 1904, one on either side of the river. Each of these joints was composed of two flanged pieces of 41-inch pipe, bolted together with a gasket of pure rubber ½ inch thick between the flanges. The bolts joining the flanges were covered with rubber tubing ⅛ inch thick; and the nuts were insulated from the casting by means of a washer of rubber ½ inch thick. The joints have a resistance of from 100 to 200 ohms when the pipe is filled with water, and are enclosed in waterproof chambers, to prevent the entrance of ground water.

These joints reduce the quantity of electricity leaving the 36-inch pipes in the river from 25 to less than 5 amperes, and reduce the quantity flowing along the pipes towards the power station from 65 to 40 amperes. The joints were expected to protect the pipes in the river at the expense, to some extent, of other portions of the pipe-line; and the measurements of currents appear to show that the effect has been substantially as anticipated, as the quantity of electricity leaving the pipe at certain points was increased about 25 amperes. As these joints reduced the quantity of electricity flowing along the pipe-line, the Railway Company desired to set similar joints at other points; and late in the year an arrangement was made for the setting of four additional 48-inch joints. As the quantity of current flowing along the pipes at different times depends on the amount of power developed at the time at the various power stations, many observations are necessary to determine the average quantity flowing even for a single day; and these have not been taken since the last joints were installed. But enough measurements were made to warrant the statement that the introduction of the joint at one of the places has substantially stopped the flow of electricity along the pipe at that point. The conditions have been changed so as to increase the amount of electricity leaving the pipe north of the joint. But there appear to be at present not more than 40 amperes flowing along and leaving the pipe-line, in place of 90 amperes; and there has also been a very marked reduction in the difference of potential between the pipes and the rails of the Street Railway Company.

The measurements thus far taken appear to indicate that the effects of setting an insulating joint somewhere near the middle of a pipe-line, one portion of which is electrically positive and another negative to the car tracks, are as follows: (1) To stop the direct flow of electricity along the pipe-line at the point where the joint is set, and to reduce considerably the amount of electricity flowing along other parts of the line. (2) To lower the average potential of the line on the negative or power station side of the joint. (3) To raise the average potential of the line on the positive side of the joint. (4) To maintain a difference of potential of several volts between the positive and negative sides of the joint, and to produce conditions tending to increase electrolytic action at that point, unless the joint is carefully located in dry ground. (5) To cause a new distribution of electrical conditions, under which the two sections of the pipe-line become similar to the original line, with one portion of each positive and the other negative to the car tracks, so that the number of positive areas is increased by one for each joint.

Both in August and in November, 1903, the attention of the officials of the Boston and Northern Street Railway Company was called to the serious injury which had then been done to the Board's pipes, both in Chelsea and Lynn, by currents of electricity returning to the power stations. Excavations made in November in Lynn showed that there were pittings in a 12-inch pipe 0·45 inch in depth, leaving only 0·25 inch of the original thickness of iron. As it was not deemed prudent to continue to risk the failure of this pipe-line, it was relaid during the past year for a length of 593 feet. All the pipe was laid in 1898, and when removed it was badly decomposed; and in several places very little of the original metal of the pipe remained. The officials of the Railway Company were notified that the pipes were to be relaid before the work was commenced, and were asked if they desired to adopt any preventive measures. They did not do so; and on the 5th of December, after the pipe was relaid, measurements showed that there were 20 amperes of electric current leaving the relaid section. It is probable that, if nothing is done to alter the conditions, it will be necessary to again relay these pipes not later than 1910.

The regular annual survey to determine the relative electrical potential of the Metropolitan pipe-lines and the street railway tracks, and the amount of electricity flowing on the pipes at the several gauging stations, was undertaken in April. In making these surveys, voltmeter readings were taken at each station every twelve seconds for a period of five minutes. The figures are obtained from readings between 9 a.m. and 4 p.m. during the months of March and April, and do not represent extreme results which would be obtained during the hours of maximum travel. The average of these readings, compared with similar readings made in 1903, shows that the electrical pressures were generally reduced during the past year over the entire distribution system. At a few points, however, the conditions are worse than in 1903. At one place in Brookline the voltage between the pipe and the rails has increased from 2½ to 5 volts, possibly due to increased traffic on the Boston and Worcester line. At another place (in Milton) the average voltage has increased from 18 volts in 1903 to 22 volts in 1904, and the maximum from 35 to 60 volts. This is due to poor track construction, and to a lack of return feeders on the Old Colony Street Railway Company. Early in the year the Boston and Northern Street Railway Company were notified that there was a large difference of potential between the Board's pipes and their tracks in Stoneham, and that a considerable quantity of electricity was flowing along the pipe. During the past year the Railway Company relaid the tracks, and provided better returns for the current; so that the conditions have been greatly improved. But even now there is a good deal of current flowing along the pipe.

In January, the attention of the Old Colony Street Railway Company was called to the fact that a current of from 15 to 45 amperes had been measured flowing on a 12-inch pipe in Hyde Park, with differences of from 5 to 18 volts between the pipe and the rails. In June, the pipe was uncovered at several points for examination, and pits about 1-16th inch in depth were found on several pipes. A service-pipe of the Hyde Park Water Company was found to be resting upon the 12-inch pipe, making an electric contact by means of which about 10 amperes of electricity passed from the Metropolitan main to the pipes of the Company. By raising the service-pipe and breaking the electric connection, the flow of current along the pipes was reduced about one-half.

FLAME TEMPERATURE OF FUELS.

A recent number of the "Zeitschrift für Beleuchtungswesen" contained an article dealing with the calculation of the temperature of the flame of fuels, based on Mahler's method, which was described last year in the "Revue Universelle des Mines."* The following is a summary of the article, in so far as it appears of interest to our readers.

A knowledge of the chemical composition and the calorific value, determined by the bomb, suffices for the practical comparison of fuels. The flame temperature can be calculated from these data. Flame temperature is here understood to mean the temperature attained by complete combustion in air at constant pressure. It is a theoretical absolute value which is not reached in practice, owing to the defective character of all heating apparatus; but nevertheless it is in many cases of the utmost value as a guide to the judgment. Mahler gave the following formula for calculating the calorific value (q), under constant pressure, of the unit weight of a fuel.

$$(I.)\quad q = N\,(Cm\,T_1 - Cm\,T_0)$$

in which Cm = the mean specific heat of one of the combustion gases between zero and T_0 on the absolute scale.
N = the number of molecules in "mol" volumes of 22·32 litres (the "mol" is Ostwald's term for the molecular weight in grammes).
T_0 = the initial temperature (from the absolute zero).
T_1 = the final (or flame) temperature (from the absolute zero).

Specific heat increases with the temperature, and the changes are so great at high temperatures that they cannot be disregarded. Mallard and Le Chatelier apply the following equation to express mean specific heat:—

$$Cm = \alpha + \beta T$$

in which α and β are coefficients, having the following values for the different products of combustion:—

	α	β
For the permanent gases (nitrogen and carbonic oxide)	$6{\cdot}5 \times 1000^{-1}$	$0{\cdot}6 \times 1000^{-2}$
For superheated aqueous vapour	$6{\cdot}5 \times 1000^{-1}$	$2{\cdot}9 \times 1000^{-2}$
For carbonic acid	$6{\cdot}5 \times 1000^{-1}$	$3{\cdot}7 \times 1000^{-2}$

Taking T_0 as 273 or 0° C., and θ as = the final temperature on the Centigrade scale, and T_1 therefore as = $\theta + 273$, then inserting the foregoing values in Equation I., it becomes:—

$$(II.)\quad q = N\left[\frac{\alpha\,\theta}{1000} + \beta\,\frac{(\theta + 273)^2 - 273^2}{1000^2}\right]$$

The value of θ can be found from this equation if the number of molecules formed by the combustion and the calorific power, stated in large calories, are known.

The following table, however, facilitates the rapid solution of this equation. The approximate value of the flame temperature will usually be known, and trials are then made with the help of the table, taking the known number of molecules, until the temperatures in the table which give the calorific values next above and below the ascertained calorific value have been found. Then for the small interval of 100° between the two temperatures no appreciable error will be introduced if the calorific values are taken as proportional to the temperature, and the exact value of the flame temperature thus ascertained. The table shows the heat, in calories, of the "mol" volume of 22·32 litres, under constant pressure, for different gases:—

Temperature. Degrees Centigrade.	Nitrogen, Oxygen, Hydrogen, Carbonic Oxide.	Superheated Aqueous Vapour.	Carbonic Acid.
	Calories.	Calories.	Calories.
0	0·00	0·00	0·00
100	0·68	0·83	0·87
200	1·39	1·73	1·85
300	2·10	2·67	2·87
400	2·82	3·69	3·99
500	3·56	4·76	5·17
600	4·31	5·89	6·44
700	5·07	7 07	7·77
800	5·85	8 30	9·16
900	6·63	9·62	10·66
1000	7·43	10·98	12·12
1100	8·24	12·40	13·85
1200	9·05	13·87	15·55
1300	9·89	15·41	17 33
1400	10·73	17·00	19 18
1500	11·59	18·65	21·11
1600	12·46	20·35	23·09
1700	13 34	22·13	25·18
1800	14·23	23 93	27·31
1900	15·14	25·83	29·55
2000	16·05	27·76	31·83
2100	16 98	29·74	34·18
2200	17·92	31·81	36·64
2300	18·87	33·91	39·14
2400	19·84	36·10	41·75
2500	20·81	38·32	44·40
2600	21·80	40·62	47·16
2700	22·80	42·95	49·96
2800	23 82	45·37	52·87
2900	24 84	47·82	55·81
3000	25·88	50·35	58·86

An example will elucidate the manner of using this table. There are, of course, four volumes of nitrogen introduced from the air with every "mol" volume of oxygen. The combustion of hydrogen will serve as an example. The equation is—

$$H_2 + \frac{O_2}{2} + 2N_2 = 2N_2 + H_2O\ (\text{gaseous}) + 58{\cdot}2\ \text{cal.}$$

Thus the products of combustion of one molecule (2 grammes) of hydrogen are two molecules of nitrogen and one molecule of aqueous vapour, and q = 58·2 calories. Assuming the probable temperature of combustion to be between 1800° and 2000° C., the calorific value is reckoned by the aid of the table for three temperatures, viz.:—

—	1800° C.	1900° C.	2000° C.
Heat of—			
2 molecules of nitrogen	28·46	30·28	32·10
1 molecule of aqueous vapour	23·93	25·83	27·76
	52·39	56·11 (q_1)	59·86 (q_2)

The true calorific value of 58·2 lies between the figures marked q_1 and q_2, and hence the flame temperature θ must be between 1900° and 2000° C. The difference of flame temperature over this small interval of 100° may be taken as proportional to the difference of calorific value, which is 59·86 − 56·11 = 3·75, and

* See "JOURNAL," Vol. LXXXVII., p. 884, and Vol. LXXXIX., p. 230.

therefore one calorie corresponds with a change of temperature of 1000 ÷ 3·75 = 26·7°. Consequently, the difference between the calorific value of 56·11 at 1900° and the ascertained calorific value of 58·2 corresponds with a change of temperature of 58·2 − 56·11 = 2·09 × 26·7 = 56°. Therefore the temperature of the hydrogen flame is 1900 + 56 = 1956° C.

The flame temperatures of a number of fuels have been calculated in this way, and the results given in the issues of the "JOURNAL" already mentioned. In the following table the net calorific power has been converted into British thermal units:—

Fuels.	Net Calorific Power. B.T U. per Pound.	Flame Temperature. Degrees Centigrade.
Solids—		
Oak wood	7,860	1865
Bohemian lignite	10,060	2020
Flaming coal from Blanzy	14,500	1990
Gas coal from the Saar field	14,600	1950
Rich coal from Treuil	15,450	2010
Anthracite	14,920	2030
Pennsylvanian anthracite	14,650	2000
Peat	10,060	2020
Liquids—		
Ethyl and methyl alcohol	..	1700
Amyl alcohol	..	1850
American crude petroleum	18,720	2000
,, refined ,,	18,500	1660 (?)
Gases—		
Hydrogen	..	1960
Carbonic oxide	..	2100
Methane	..	1850
Acetylene	..	2350
Coal gas	..	1950
Water gas	..	2000

It will be seen that the theoretical flame temperature for the solid fuels is in most cases not far from 2000° C., which probably represents the theoretical temperature of combustion of fuels of vegetable origin. It is instructive to compare the theoretical figures for the gases with the temperatures found experimentally by M. Féry with his optical pyrometer (see "JOURNAL" for Jan. 26, 1904, p. 215). The comparative figures are—

	Found (Fery).	Calculated (Mahler).
Hydrogen	1900° C.	1960° C.
Coal gas	1871° C. (Bunsen flame)	1950° C.
Acetylene	2548° C.	2350° C.
Alcohol	1705° C.	1700° C.

DETECTION AND UTILIZATION OF CYANOGEN.

Herr F. Weehuizin has found that if an alkaline solution of phenolphthalin, together with a 1 to 2000 solution of copper sulphate, be added to a solution of hydrocyanic acid, a red coloration is produced in the cold; the phenolphthalin being oxidized to phenolphthaleïn. A perceptible coloration is produced in a solution containing 1 of hydrocyanic acid per 500,000.

To obtain hydrocyanic acid from ferrocyanides, J. Tcherniac (English patent No. 12,634 of 1904) proposes to heat an alkali ferrocyanide with sulphuric acid of such a concentration that it will neither produce carbon monoxide nor give up much water when gently heated, and the heating is continued for as long as may be necessary to obtain the whole of the cyanogen as hydrocyanic acid. For example, a saturated solution of sodium ferrocyanide is heated with an excess of 20 per cent. sulphuric acid in a vessel provided with an inverted condenser, and a current of a non-oxidizing gas, such as carbon dioxide, is passed continuously through the system.

The Société Badische Anilin und Soda Fabrik have taken out a French patent (No. 347,373 of 1904) for the purification of cyanides. The impure cyanides are distilled with a solution of an ammonium salt, preferably under diminished pressure, and the ammonium cyanide formed is received in an acid or an alkaline solution as may be required. For example, potassium ferrocyanide containing cyanate is dissolved in water to which ammonium chloride is added, and on heating the distillate is received in a solution of sodium hydroxide; the sodium cyanide solution obtained being subsequently concentrated under diminished pressure. In the case of crude barium cyanide this is suspended in water through which carbon dioxide is passed, and ammonium carbonate is added to the cleared liquid in equivalent proportion. The solution is distilled *in vacuo* until all the ammonium cyanide has passed over, which may be received in caustic soda solution.

Potassium-ammonium ferricyanide, which is used for aniline-black printing, was made by Schaller by boiling a solution of potassium ferricyanide with sulphate of ammonia. J. Matuschek has now, according to the "Chemiker Zeitung," substituted ammonium chloride for the sulphate, with similar results, and obtained the best yield by dissolving 10 grammes of potassium ferricyanide in 20 grammes of water on the water bath, adding 4·86 grammes of ammonium chloride and crystallizing the solution. By boiling the solution for 12 hours, a prussian blue containing ammonia is formed. This is explained by the dissociation of the ammonium chloride in aqueous solution. The acid thus set free acts on the ferricyanide, with formation of prussian blue; and the latter is partially decomposed by the free ammonia, with production of ferric hydroxide and prussian blue containing ammonia.

COKE AND VOLATILE MATTER IN COAL.

In the determination of the coke and the volatile matter contained in a coal by the ordinary method, G. Arth has found inaccuracies to occur. The percentage of coke obtainable in practical work is not only less than that shown by the crucible test, but the difference varies with the size of crucible employed. To overcome this disparity, which is mainly due to the insufficient temperature at the bottom of the crucible, he has devised a special form of crucible cover, and he uses his apparatus in conjunction with a blowpipe instead of a bunsen burner. The laboratory blowpipe is arranged to give a steady flame of 28 to 30 centimetres in length. The crucible, which is placed about 10 centimetres above the orifice of the blowpipe, is furnished with a lid into which it fits to a depth of 6 mm. The lid is constructed with a central platinum tube, 15 mm. long and 5 mm. in diameter, with a loose cap. The cap is on the tube when the heating is commenced, but is removed as soon as a luminous flame appears, and is replaced when the flame is on the point of disappearing. The heating of the crucible may be prolonged for more than a minute after the disappearance of the flame, without any error being caused. The results are 1 to 2½ per cent. lower for the coke, than when a bunsen burner is used, and the coke contains about 1 per cent. less hydrogen.

Coke the Best Bakery Fuel.

We have received from the publishing house of R. Oldenbourg, of Munich, a copy of a *brochure* by Herr W. Bucerius, Engineer to the National Industrial Chamber of the Grand Duchy of Baden, on the "Rational and Smokeless Heating of Bakers' Ovens." The matter is reprinted from the pages of the "Journal für Gasbeleuchtung." The conclusions at which the author arrives, after an exhaustive consideration of the question, are: (1) The most rational way of conducting the heating of bakers' ovens is without smoke or soot, and it is at the same time the cheapest in respect of working costs. (2) The production of soot in such ovens can be most simply avoided by using smokeless fuel, coke; gas coke being the cheapest. (3) Coke can be burnt in any of the oven furnaces designed for coal with but trifling alterations. (4) The cheapest, and the most completely smokeless, working of a baker's oven furnace can be achieved by using a slow-combustion furnace charged with gas coke. The author points out the great advantage which should accrue to gas-works from a general recognition of the superiority of coke firing for bakers' ovens, and the incidental advantages to the community at large in the avoidance of smoke and in economy of fuel.

Flame Temperature of Water Gas.

The current number of "Le Gaz" contains an account of a meeting of an association of engineers and managers of gas-works in Normandy, at the St. Quentin works, under the presidency of M. Lemerle, for the purpose of inspecting the manufacture of water gas on the Dellwik-Fleischer system, as carried on there by M. Frère, the Manager of the local Gas Company. In the course of the description of the process, reference was made to some experiments which had been carried out at the works to ascertain the flame temperature of water gas and of its constituent gases. The water gas used in the experiments was composed of equal volumes of carbon monoxide and hydrogen. As the result of nine tests, the temperature of the flame of dry carbonic oxide containing only 1 per cent. of carbon dioxide was found to be 1747°. When the percentage of carbon dioxide was raised to 15 per cent., the temperature was only 1552°. The temperature of combustion of dry hydrogen, without the admission of air to the bunsen burner, was 1700°; with full admission of air, 1866°. The temperature of combustion of a mixture composed of 50 per cent. each of carbonic oxide and hydrogen was 1775°. It may therefore be assumed that the flame temperatures of the different gases are approximately 1750° for the carbonic oxide, and 1865° for the hydrogen, and slightly below 1775° for the water gas, consisting of carbon monoxide, hydrogen, and carbon dioxide.

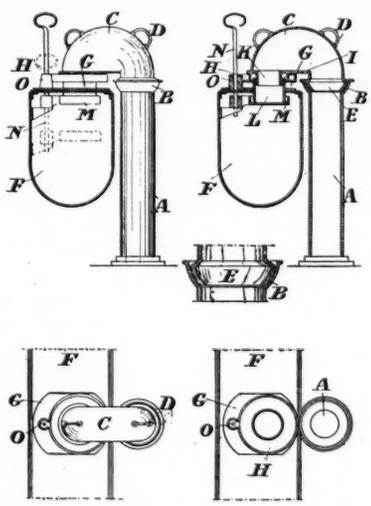
Production of Hydrogen and Acetylene.—Mr. J. T. Nance has found that the gas produced by heating the residue left after gently igniting a mixture of magnesium powder and powdered wood charcoal with dilute hydrochloric acid consisted mainly of hydrogen; but it also answered to the various reactions of acetylene. He found further that if the residue left after burning magnesium in carbon dioxide, or after heating magnesium with carbon or in air containing carbon dioxide, be treated with water or dilute hydrochloric acid, an odour resembling that of geraniums is produced, owing to the presence of a hydrocarbon formed by the action of the water on the residue. He concludes that a magnesium carbide is formed which does not interact with water so vigorously as calcium carbide.

REGISTER OF PATENTS.

Gas Delivery and Purifying Apparatus for Coke-Ovens and Gas-Generating Plant.—Koppers, H., of Essen-Ruhr, Germany. No. 16,008; July 19, 1904.

The rigid valves or double bends provided with a liquid seal on both sides hitherto employed in coke-oven or gas-generating plant receivers for connecting the rising pipe with the gas collecting pipe, present (the patentee remarks) the defects that, in the former, the expansion due to heat tends to produce rupture or leakages, while in the latter the hardening of the tar in the seals, especially in the rising pipe, tends to cause fracture of the bends when attempts are made to clear them. In addition to this, inspection is rendered more difficult when the apparatus is dismounted, "because the opening of the collecting pipe is without any obturation when the connecting bend has been removed."

The rising pipe A mounted on the plant, widens out at its upper end in such a manner that a spherical portion B is formed. The double bend C, which for the purpose of facilitating dismounting is provided with eyes D, stands with its foot E in the widened portion of the rising pipe, and is provided with ribs which constitute a dry joint. Upon the other extremity of the double bend a liquid seal is provided. To this



end a tubular socket G is furnished on the gas collecting pipe F; and this socket in the first place constitutes a cup H in which the bend engages by means of the annular part I. In order that the overflowing tar may not be able to enter this cup, a tubular addition K of the bend enters the opening of the socket to a certain extent, so as to permit the tar to drop only below the liquid seal. The socket presents a similar prolongation in the form of a tubular addition L entering the gas collecting pipe F. A dish-shaped trough M is adjusted in the pipe at the desired height by means of a rod N and guides O. In its lower position (represented in dotted lines) it constitutes the catching device for the pitch dripping out of the bend C from the tubular extension K or L, so that it collects in this trough. In the position shown in full lines, the trough, in combination with the tubular extension, forms a liquid seal, which, when the bend is removed, obturates the gas collecting pipe F towards the exterior.

In operation the rising pipe A expands to a certain extent owing to the great heat and lifts the bend C, which bears, on the one hand, on the socket G of the gas collecting pipe, while, on the other hand, it is able to rotate freely in the ball-joint formed by B and E, without affecting the proper bearing or the formation of a perfect joint with the rising tube. The gas passes through the bend C into the gas collecting pipe F, and the tar and other products carried with it collect preferably on the dish M. If it is desired to inspect the joints when the plant is inoperative or to remove the tar from the dish M, this latter is raised by the rod N in its guides O, so that it forms a liquid seal with L. The bend may then be raised and swung aside at the ball-joint on A without difficulty, "without there being any danger of fracture of the cups or any similar injury to the apparatus." The tar or pitch which has collected in the dish may then be readily removed.

Gas-Engines.—Cherry, T. W. F., of Newcastle-on-Tyne. No. 19,415; Sept. 8, 1904.

This invention has for its chief object to provide an improved reversible double-acting gas-engine working on the four-stroke cycle and particularly suitable for marine purposes. The improvements appertain to that type of engine in which the starting is effected by compressed air admitted to the cylinder or cylinders of the engine, or one or more of them, until sufficient momentum is attained, whereupon the compressed air is cut off and the cylinders are set firing to continue their normal running. The compressed air is admitted alternately to both ends of the cylinders, which are used for starting and which thus act during starting in a similar manner to a double-acting steam-engine; while when the engine has been started and the cylinders are set firing, they work on the four-stroke cycle.

The invention aims to provide the following improvements in engines of this kind: (1) Means for imparting a double lift to the exhaust valves when starting with compressed air—that is to say, a lift every second stroke of the piston—so as to provide for the necessary double-acting operation of the cylinders when working with compressed air. (2) Means for putting the compressed air distributing valves into and out of operation according as the engine is being started or is to run on with gas supply. (3) Means for putting the valves which admit the gaseous mixture into and out of operation. (4) An arrangement of sun-and-planet or equivalent gearings which will permit the half speed cam shafts which operate exhaust valves, mixture admission valves, and compressed air distributing valves to be rotated by hand or otherwise, so as to alter the position of the cams for reversing or other purposes.

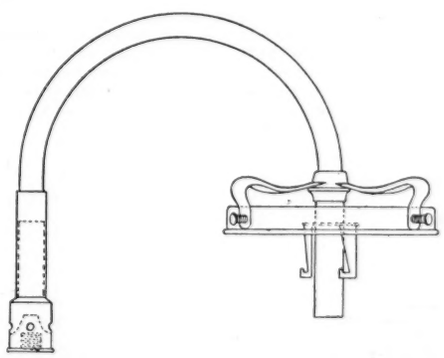
Discharging Gas-Retorts.—Dempster and Sons, R., Limited, Broadhead, J. W., and Ordish, F. W., of Elland. No. 16,223, July 22, 1904.

This invention (applicable to the discharging of horizontal retorts) consists, firstly, in the arrangement of tubular telescopic rakes or rams for pulling or pushing out the coke from the retorts; secondly, in an improved carriage for traversing the rakes or rams along the retort-house from one set of retorts to another, on which carriage is arranged the necessary gear for lifting, lowering, deflecting, extending, and collapsing the telescopic rake or ram—the power used being steam, electric, hydraulic, or pneumatic, or being received by ropes, belts, or otherwise from any convenient source; and, thirdly, in means for cooling the tubular rakes or rams while in action.

A detailed account (illustrated) of this invention appeared in the "JOURNAL" for Nov. 22 last, pp. 610-11.

Incandescent Gas-Burners.—Taylor A., of Stroud Green, N. No. 20,824; Sept. 28, 1904.

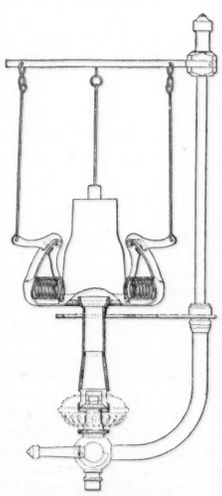
This invention relates to an adaptor by means of which it is possible to easily and quickly convert an ordinary into an inverted incandescent gas-burner.



The illustration shows how the invention is put into practice; the adaptor, with the inverted mantle support, being mounted over the bunsen tube. The curved tube is so constructed that one end is adapted to be tightly slipped over the bunsen tube after the burner-head and the draught plate have been removed; the tube being thus enabled to be turned on the bunsen tube in all directions. The tube at its other end terminates in one or more downwardly directed arms or branches, each fitted to carry an inverted incandescent mantle.

Anti-Vibration Fittings for Incandescent Gas-Burners.—Burley, J. D. C., and Gilmore, A. E., of Stourbridge. No. 21,007; Sept. 30, 1904.

This invention is an amplification or development of the invention described in patent No. 22,603 of 1903; the object of the present invention being to provide a simplified form of tubular gas-way connection between a flexibly mounted or suspended burner and its gas-supply fitting, which "will afford a minimum of resistance, drag, or impedance to the free movements of the burner, although nevertheless constituting an effective medium of conveying gas thereto."



The connection between a suspended or flexibly-mounted incandescent gas-burner and the gas-supply nipple which is carried by the fixed part of a lamp, consists, in the arrangement shown, of a length of light drawn tubing, the lower end of which seats itself onto, and is supported by, the fixed nipple, while the upper end engages with a tube or gas-way socket depending from the underside of the burner. In order to make the connection between the parts flexible, and prevent any interference with the free movement of the burner, the foot end of the tube is formed with a conoidal, spheriodally cupped, or similar seating adapted to take upon the similarly shaped end of the gas-nipple so that the tube will be capable of a universal movement upon the nipple by which it is supported. The upper end of the tube is made with a bulbous head which takes into a tubular gas-way extension or socket on the underside of the burner and is also capable of a universal movement with respect to it, in addition to providing for a sliding or rising-and-falling motion of the burner tube upon the swivelling end of the connection tube.

Lighting and Extinguishing Gas-Lights from any Desired Point.—Schwarzhaupt, A., of Paris. No. 22,797; Oct. 22, 1904. Date claimed under International Convention, Oct. 24, 1903.

This invention is more particularly applicable to burners in halls, staircases, and like places, as it "permits the lighting or extinguishing of any number of burners from all desired points distributed over any desired area, without employing those means generally in use for same, such as turning off the gas by means of a tap or other suitable device operated by electricity or the like." With this object in view, the gas supply-pipe is brought into the ground floor in the usual way, where it is divided into a system of pipes—two for example—which are carried up to the top floor, where they are connected together again to form one. This pipe is conducted back to the ground floor; and it is to this pipe that the burners are fitted. At the top and bottom of the double pipe going from the ground floor to the top floor, a multiple-way tap is fitted; and on each floor a similar tap is fixed, so that both the double pipes can communicate with each other. In this way of arranging the gas-pipes, and the multiple-way taps of each floor, it is possible by operating any one of the taps to turn on or off the light, according to whether the former rotation of this or the other tap had turned the gas off or on.

Automatically Lighting and Extinguishing Gas.—Jacob, P. & C., of Zwickau, Germany. No. 564; Jan. 11, 1905.

This invention has for its object to provide means for lighting and extinguishing gas-lights in streets, districts, and towns; the apparatus combining "the advantages of the various existing systems for this purpose, but without having their inherent disadvantages." The existing arrangements are divided by the patentees into three classes—viz., (1) the district lighting is either effected by the increased pressure in the pipes supplied from the gas-works during the whole time the lamps are alight; (2) the lighting and extinguishing are regulated by clockwork at definite periods, and the arrangement is useless at suddenly occurring darkness or fogs; (3) pneumatic installations which require a separate independent high-pressure gas-conduit. According to this invention, continuous high pressure is not required; while, moreover, the automatic lighting-up of the lamps can be effected at all times, and afterwards series of lamps can be extinguished, while others are kept alight for hours.

A is the socket for screwing the apparatus to the gas-lamp. B is a cup in which the bell C is floated by a suitable liquid; the cup being hermetically sealed or closed by a cover D. A small pipe F provides the gas for the pilot flame or bye-pass. The bell is fitted with a thin rod H, which forms a catch to stop the clockwork under normal gas pressure of the main. The burner inlet-nozzle L is controlled by a rotary valve M operated by clockwork; the latter being wound up through a hole ordinarily closed by a screw N. The plug of the valve M is fixed to the bearing plate of the clockwork, and to the shell is secured a wheel R in gear with the clockwork. The shell has lateral holes adapted to be brought into coincidence with a gas-passage in the plug, which latter carries the inlet-nozzle L. Thus the rotation of the clockwork causes the wheel R and shell M to turn so as to open or close communication of the interior of the cup B with the burner.

Fig. 1.

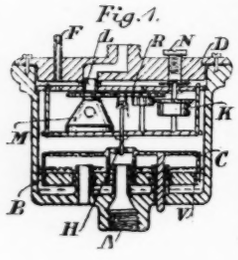


Fig. 2.

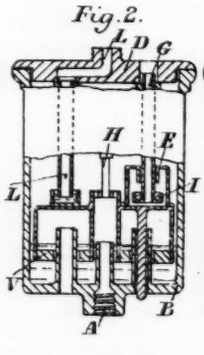


Fig. 3.

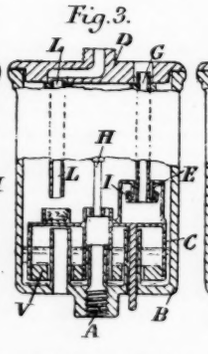
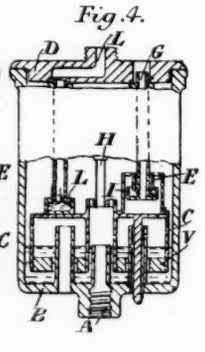


Fig. 4.



The automatic action is as follows: With normal gas pressure, the bell is in the position indicated at fig. 1, and stops the clockwork. At the time for lighting up, the pressure in the main is increased from the works for a short time; and this causes a depression of the floating bell in each apparatus and the lowering of the rod H, which latter has prevented the rotation of the wheel R by being in the path of the pin shown. The lowering of the rod allows the pin to escape through the slot of the rod, whereby the wheel R is permitted to turn until another pin strikes against the rod. By this motion, the rotary valve M has been turned one-third of a revolution and supplies gas to the burner, where it ignites at the pilot flame. Hereupon the normal gas pressure is restored and continued for normal lighting—causing the bell to rise and one of the pins to pass through a slot, and finally come in contact with the rod H.

At the time for extinguishing the lamp, the works again increase the pressure for a short while; thus allowing the wheel R to again turn one-third of a revolution and close the valve M, which cuts off the gas supply for the full evening service—the valve having a single hole. When some of the lamps are required for service during the night, the valve has two holes; the second hole supplying the lamps for late service. When it is afterwards desired to extinguish all the street lights, the pressure is once more increased at the works and a further rotation of the valve takes place in the manner stated.

Referring, now, to the slightly modified apparatus shown in figs. 2, 3, 4, it is to be noted that the clockwork is not here used to open and close the gas supply, but to maintain the bell in the required position. The bell C, whose position or floating capability can be accurately adjusted by a removable disc V, is provided with a small cup filled with mercury. It further carries in an upper chamber an inwardly depending rim E adapted to dip into an annular cup I at the end of a depending tube G. At daylight, when the main flame is not required, the bell is in the position shown in fig. 2, with the main-burner pipe dipping into the cup but with the rim E free, thereby allowing the gas to pass through the small tube G to the pilot flame. The rod H of the bell acts on the main wheel R of the clockwork, as previously explained.

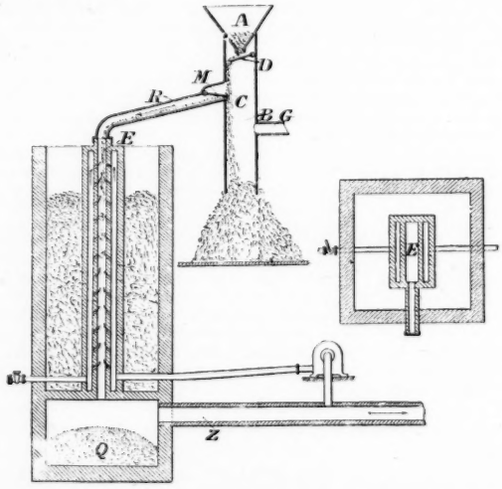
For lighting the lamps, the gas-works provide increased pressure for a short time, which causes the bell and its rod H to descend to the position shown in fig. 3. This movement brings a slot opposite the end of the pin and allows the wheel R to make one-third of a revolution till the second pin comes in contact with the rod H. The lowering of the bell effects the opening of the gas-supply tube L for the main burner; while the small tube G of the pilot flame is shortly after closed. On the wheel R is provided a stop K, which limits the motion of the rod H and the bell to a centre position, as shown in fig. 4.

For extinguishing the lamps, the pressure is again raised so as to cause the bell C to sink and the wheel R to revolve, while the rod H is in the position shown in fig 3—the wheel turning till one of the pins strikes against the rod H, which, with the bell, has in the meantime ascended. This action closes the main burner, but not before it has lighted the pilot flame.

For the so-called small-hour lamps, the wheel R is provided with another stop between the pins In these lamps, when the other early evening lamps are extinguished, the bell is maintained in the position shown in fig. 4, and consequently the lamps are kept burning. Only after the pressure is again increased for a short period will the clockwork be re-started and the bells of the remaining lamps be permitted to assume the position shown in fig. 2—that is to say, all the wheels R and bells B will be in the same position, and all the lamps will be extinguished.

Producing Gas from Pulverulent Fuel.—Marconnet, G., of Paris. No. 1587; Jan 26, 1905. Date claimed under International Convention, Feb. 1, 1904.

In gas-producers ordinarily employed (the patentee remarks) it is difficult to burn fuel containing either a sufficiently large quantity of volatile matters, or fuel whose combustion produces an undue quantity of adhesive clinkers. This difficulty arises from the fact that the fuel to be burned is delivered into the producer in heaps at regular intervals, often wide apart. The parts of which the charge of fuel is composed are first of all conductively heated; and, at the same time, distillation commences in the freshest layers, and simultaneous combustion in the hottest parts. The presence of these layers in contact at a high temperature causes the vitrifiable portions to become (so to speak) welded together or to adhere to the neighbouring walls of the producer; and they ultimately—unless removed—choke up the apparatus. Moreover, as the combustion takes place in a somewhat restricted area, and at a constantly decreasing temperature, the result is that the hydrocarbons are not decomposed.



Again, he says, it is not possible by the ordinary method of combustion to deal with entirely pulverulent fuel, which may consist of minute particles, as fine as the finest flour, without the necessity of continually stirring the fuel heaps to prevent caking, or to fill up the pockets which form. Another difficulty that obtains in motive power installations having gas-motors and gas-generators consists in the fact that the motor very often has to produce a variable power and the producer often contains a considerable quantity of coal. The result therefore is that the motor of variable power will be supplied with gas resulting from the more or less vigorous combustion of a constant quantity of fuel, without regard to the power developed by the motor. In order, however, that the composition of the gas produced may be constant, it is necessary that the gas-generator should be capable in a given time of burning a quantity of fuel exactly in relation to the power of the motor at a given moment, and to burn it under the same conditions of chemical reaction, whatever this power may be.

The present invention consequently relates to a process and an apparatus which allow of this combustion being made complete and possible whatever the fuel may contain, in volatile products, cinders, adhesive clinkers, and (above all) when the fuel is in the form of very fine dust, and to proceed in such a manner that at any given instant only the exact quantity of coal sufficient for producing the gas necessary for the power of the motor at the instant shall be burnt; the residues of the combustion (cinders and clinker) being automatically deposited at a part whence they can be easily removed.

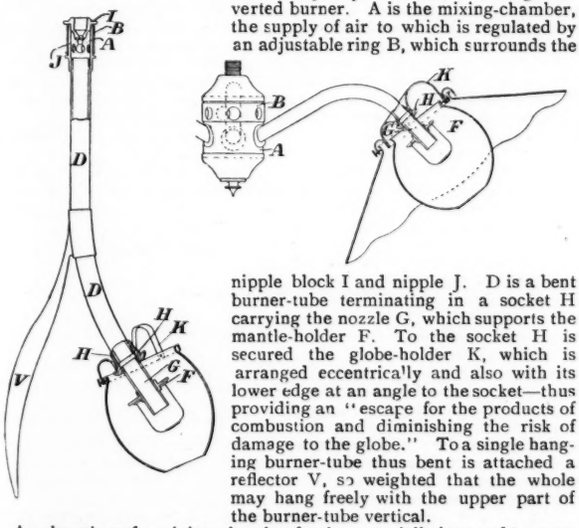
First and foremost, the fuel (if it is not already in a pulverulent state) is reduced by grinding to as fine a powder as may be desired. In this form it is deposited in a hopper A, in sufficient quantity for any desired length of time. The bottom of the hopper is provided with a distributing device which allows the powdered fuel to flow in the form of spray into a vertical conduit B. The feed is so regulated that the quantity of powdered fuel falling is greater than is necessary for the producer to supply sufficient gas to the motor at its maximum power. As the fuel falls into the vertical conduit, the resistance which the air admitted by a branch conduit G opposes to its fall has the effect of so dividing its molecules, that at a point C in the conduit it appears as a cloud of falling coal dust. From this point a feed conduit R branches off, which at its other end opens into a vertically arranged fall tube E. This tube is constructed of fire-clay, and is preferably an elongated rectangular oblong. The two side walls form, in conjunction with the outer walls, jackets or conduits, likewise constructed of refractory earth. The inner walls are each pierced with small holes placing these jackets or conduits in communication with the conduit or fall tube. The gas issues by small holes over the whole height of the wall; and, if a light be put to one of the orifices, the whole column of orifices takes fire, and the wall thereupon becomes transformed into "a veritable gas-grill."

The base of the fall tube E opens into a somewhat large lower chamber Q (constructed of refractory earth), which is itself connected by a conduit Z to a gas-purifier, and to the motor or other apparatus in which it is to be used.

Supposing a motor to be used, the operation is as follows: The motor being at rest there falls, by the action of the distribution mechanism of the hopper A, a cloud of coal dust past the orifice C of the conduit B. Under these conditions, if one or two turns be given to the motor it will draw in at G a fixed quantity of air, which will enter the producer by the orifice C, drawing in with it a quantity of coal dust in proportion to the speed with which the air passes through the orifice. This mixture of air and coal dust as it falls in the tube E comes in contact with the burners therein in succession. The coal first begins to distil and then burns as fast as it falls; but, at the same time, a certain quantity of air will be caused to pass through the orifices pierced over the whole height of the opposite inner wall, and this air will contribute to complete combustion. It follows therefore that on its arrival at the bottom of the fall tube E all the fuel admitted to the tube has been burnt. In consequence of the air and gas which pass through the walls and stream from the orifices, the coal dust, gases, products of the distillation and combustion of the latter, as also the cinders which result therefrom, cannot touch these walls.

Incandescent Gas-Lamps.—Helps, G., of Nuneaton. No. 2733; Feb. 10, 1905.

This invention relating to inverted or partially inverted incandescent gas-burners will be understood by reference to the engraving—an elevation partly in section of a single inverted burner. A is the mixing-chamber, the supply of air to which is regulated by an adjustable ring B, which surrounds the



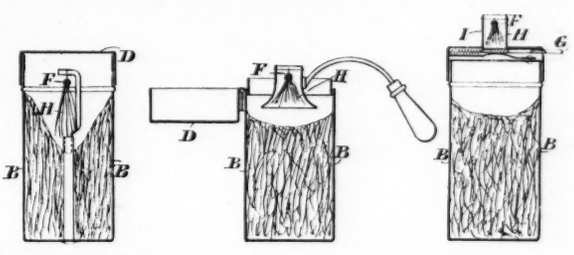
nipple block I and nipple J. D is a bent burner-tube terminating in a socket H carrying the nozzle G, which supports the mantle-holder F. To the socket H is secured the globe-holder K, which is arranged eccentrically and also with its lower edge at an angle to the socket—thus providing an "escape for the products of combustion and diminishing the risk of damage to the globe." To a single hanging burner-tube thus bent is attached a reflector V, so weighted that the whole may hang freely with the upper part of the burner-tube vertical.

An elevation of a mixing-chamber for three partially inverted burners is also shown.

Automatic Ignition Devices.—Kellermann, J., of Berlin. No. 8249; April 18, 1905.

In self-acting igniting devices heretofore employed, the action of gases escaping under pressure from an opening is made use of, and well-known gas-igniters are based on this principle. The patentee has, however, found that this action will also take place in the case of the generation of vapours from suitable liquids without any over-pressure as soon as the receptacle containing the liquid is opened, and the vapours which are generated without over-pressure are allowed either to mix with the air outside the receptacle (and when thus mixed, to impinge upon an igniter), or, when air is allowed to enter into the box, where it is mixed with the vapours contained therein, the mixture then flowing around the igniter which is introduced into the receptacle.

The preferred form of procedure, and the most simple manner of producing the ignition, is as follows: In a vessel containing an easily vapourizing liquid which is readily inflammable if mixed with air—such as methyl alcohol—a wick is placed in which the liquid is absorbed and conveyed to the igniting point by capillary action. The wick shows a certain degree of humidity; but, preferably, there is a sufficient quantity of the wick to absorb all the liquid. The box B is closed by a lid or cover D, as shown in the first drawing, and an igniting pill or



igniting body F with igniting wires H is secured in position by any suitable means within the space above the liquid and above the wick, filled with the vapour of the methyl alcohol. As soon as the cover is opened, air enters the receptacle, and a mixture of vapours and air is formed; and after a very short time the flame issues from the correspondingly shaped opening of the box, and may be used for purposes of ignition. As soon as the box is closed, the ignition ceases and the igniting flame is rendered completely inoperative, so as to insure the duration of the igniting body.

The method may be modified by so arranging the parts that the igniting device is introduced into the container B, which is filled with vapours above the moistened wick, at the moment of opening it or shortly after the opening; the admission of air into the container being at the same time regulated in such a manner that a mixture of the vapours with the air will take place. After the igniting body F (in the second example) has been used, the container is closed again, after having previously either removed the igniting body from the container or after having disconnected it from the container.

The procedure may be modified in a third manner, by placing the igniting body in front of the closed box B in a housing I and by then uncovering an opening in the closed casing, by the withdrawal of a slide G, when the ignition is to take place so that the vapours which issue from the box will flow around the igniting body F uniformly. By this means, the igniting body is also protected from air currents during the igniting action.

APPLICATIONS FOR LETTERS PATENT.

16,099.—Milne, J., "Pipes for the passage of gas for illuminating purposes." Aug. 8.

16,109.—Rosie, J., "Automatically lighting and extinguishing gas-lights by varying the pressure in the mains." Aug. 8.

16,174.—Braunstein, J., "Inverted burners." Aug. 8.

16,175.—Braunstein, J., "Valve for gas-burners having a bye-pass device." Aug. 8.

16,176.—Braunstein, J., "Upright burners for incandescent gas-lighting." Aug. 8.

16,197.—Mowat, J., and M'Kinnon, J., "Lamps for street lighting." Aug. 9.

16,198.—Mowat, J., and M'Kinnon, J., "Anti-vibrating frames for incandescent gas-burners." Aug. 9.

16,199.—Mowat, J., and M'Kinnon, J., "Lamp-lighters' torches." Aug. 9.

16,336.—Helps, G., "Bunsen burners." Aug. 11.

16,363.—Scott-Scott, J., "Preventing clinkering in the furnaces of suction-gas generators." Aug. 11.

16,386.—Koppers, H., "Treatment of gases obtained from the dry distillation or gasification of fuels." Aug. 11.

16,410.—Wallace, C. W., "Generation of acetylene." Aug. 12.

16,425.—Walker, G. A., "Gas-fittings." Aug. 12.

Sutton-in-Ashfield and Kirkby Gas Arbitration Award.—At a special meeting of the Kirkby-in-Ashfield Urban District Council held last Tuesday evening—Mr. W. H. Henson in the chair—the Arbitrator's award, amounting to £13,234, in respect of the purchase of part of the gas undertaking from the Sutton District Council, to which reference was made last week (p. 457), was accepted; and it was agreed to raise a loan of £14,000 to cover this payment and the expenses incurred. It was decided to ask Sutton to agree to the undertaking being handed over to the Kirkby Council on the 30th prox. Mr. S. Shadbolt was appointed Manager of the gas-works, as from the 1st prox.

Main-Laying Dispute in Cumberland.—A serious deadlock which has occurred in the arrangements which were in progress between the Aspatria, Silloth, and District Joint Water Board and the Wigton Rural District Council for the laying of water-mains in the parishes of Allonby, Westnewton, and Hayton, has become intensified by the refusal of the Board to accept the offer of the Local Government Board to become Arbitrators upon the question whether the Board are compelled to themselves lay the mains in the parishes in question (which they had scheduled in their Act of Parliament), or whether the Rural District Council, on behalf of the parishes, should guarantee repayment of the outlay upon the works. As the parishes are in grave need of water, the Wigton Council have decided to urge the Local Government Board to give a ruling, despite the Board's negative decision.

LEGAL INTELLIGENCE.

Welsbach Light Company of Australasia v. Lochhead.

In the Supreme Court of New Zealand, before his Honour, Sir Robert Stout, on March 26, 1904, an action for infringement of patent against the above-named defendant, who trades in Dunedin, was decided in favour of the Welsbach Company of Australasia; and his Honour granted a decree fully establishing the validity of the Company's patent, with damages and costs. On May 22 last, further proceedings were taken against Mr. Lochhead, when a writ of attachment for contempt of Court was applied for on the ground that defendant continued to sell infringing mantles—viz., the "Daylight" (branded D.I.C.). A settlement has now been arrived at by the defendant agreeing to pay all the Company's costs, and to make a declaration that he has re-exported all "Daylight" mantles from the Colony, as well as undertaking not to trade further with them.

Robberies by a Gas Inspector.

At the Westminster Police Court last Thursday, Ernest Alfred Ramsden, lately in the employ of the Gaslight and Coke Company, was charged before Mr. Francis with robberies from houses to which he gained access to inspect gas-fittings and incandescent mantles. Mrs. Evelyn Thomas, of High House, Winchester, stated that she was staying with her sister at the Rectory, Ashley Place, Westminster, on the 3rd inst., when the prisoner, wearing a uniform cap, called to inspect the gas-fittings. He went over the house, and on his departure she missed her watch and chain and her son's gold sleeve-links from another room. Evidence of a theft in similar circumstances was given by Mr. Hardy Gillard Cove, of Wellington Street, Strand, publisher, at whose office Ramsden called on or about the 29th of June. Detective Cornelius said he arrested the prisoner, from a description furnished, at St. George's Road, Southwark. After being some time in the cells, the prisoner said he sold Mrs. Thomas's watch and chain (valued by her at £20) directly after it was stolen, to a man named Golding, who had a jeweller's shop in the Walworth Road. Golding took the works out, weighed the case, and remarking, "You could not get much in pledge for it," paid two half sovereigns from his purse. Morris Golding, of 216, Walworth Road, said he had known the prisoner for years, but had never before bought anything from him. The whole of the prisoner's statement was false. Replying to the Magistrate, witness said he could not give any reason why the prisoner should invent such a story. William Perratt, assistant to Mr. Bulworthy, of London Road, Southwark, pawnbroker, produced a pair of gold sleeve-links, pledged by the prisoner for 4s. He said Ramsden had had many transactions at the shop. Detective Cornelius remarked that 13 of the tickets found on the prisoner related to pledges at this place. Mr. Francis said it appeared that no proper inquiries were made. If a few more questions were asked by pawnbrokers, there would be less property stolen. The prisoner was remanded, Cornelius stating that he had been previously convicted.

MISCELLANEOUS NEWS.

LIVERPOOL UNITED GASLIGHT COMPANY.

A Reduction in Price.

The Annual Meeting of this Company was held last Tuesday, at the Offices, Duke Street, Liverpool, under the presidency of the Chairman, Mr. H. Wade Deacon.

The report stated that there would be a reduction of 2d. per 1000 cubic feet in the price of gas (making the charge 2s. 6d.), as from June 30 last. The total revenue of the undertaking for the year ending June was £624,796, and the expenditure £482,792; leaving a surplus of £142,004. After deducting the amount taken for payment of the dividend declared last February and the interest on the debenture stock, there remained a balance of £78,072 available.

The Chairman, in moving the adoption of the report and accounts, said he was fortunate in being able to present a statement which was satisfactory, because, in spite of a decrease of income, they had very largely decreased the expenditure. In the cost of fuel, there was a saving of over £21,455, which was largely due to decreased price; and he hoped they might be able to buy at a reasonable figure for some years to come. The expenditure on repairs and maintenance of works and plant reached the very large amount of £53,558, in addition to £15,000 specially reserved last year. This was a heavy item; but he did not think they ought to expect—and, indeed, he did not expect or hope—to see any large reduction in it for some years to come. It was of the utmost importance that they should keep the works in the best state of efficiency, and try to have all their plant up to date. This was the policy the Directors had adopted, and would continue to work upon. By spending a large sum of money like this, they saw a corresponding reduction in the cost of the production of gas. The wages account had been reduced by £4198, which was almost entirely due to the better apparatus they had employed, the more successful arrangement of their work, and the cheaper way they managed to handle their fuel. Another item he should like to draw attention to was that of rates and taxes. Rates and taxes showed an increase of £1562, which was equal to about 6¾ per cent. This was a matter over which they had no control, and one on which they could hardly expect any reduction in the future. The total amount they paid in rates and taxes was £24,490, which was equal to about 1¾d. per 1000 cubic feet of gas. There was a new item in the revenue account—namely, the contribution to the superannuation fund and the moiety paid by the Company to the superannuation of officials. Regarding the latter, in 1899 it was provided that, in the case of officials who were sixty years of age and upwards, when they came on the fund, the Company paid half the superannuation, and the remainder of it came out of the fund. The amount paid last year by the Company was £1343; and this figure would increase to a certain point. But as the old superannuated officials died off, the amount would diminish, and disappear altogether. The total expenditure for the year was £482,792. There had been a slight reduction—0·4, or less than ½ per cent.—in the quantity of gas consumed during the twelve months. The reduction occurred in February, which was a genial month; but since then they had picked up nearly the whole amount lost in that time, and so they finished the year with a sale of only ½ per cent. less than the previous year, which was a record one. There had been a decrease in the amount of gas used by private consumers of £1039; but public lamps had consumed £359 worth more—the net decrease, therefore, being £680. The price of residuals had been low during the year; and the Company had lost under this head, as compared with the previous year. The revenue from coke was £7725 less, from tar £7027 less, and from ammonia £1431 less—altogether a decrease of £16,183. He did not think they could expect to receive even as much this year, as the price of coke was tending to fall, and that of tar was not likely to rise immediately. The total income for the year was £624,796. Deducting from this the expenditure, there remained a balance of £142,004 to carry to the profit and loss account, which, with last year's balance of £55,443, made a total to the profit and loss account of £197,447. From this had to be deducted the interest on the debenture stock and the two half-yearly dividends, and there remained £78,072 to carry forward, subject to the half-year's dividend (£53,183) being paid from it. This left them a surplus of £24,889. One penny per 1000 cubic feet of gas sold produced in round figures £13,000; and the Directors proposed to distribute the surplus of £24,889, and a little more, by reducing the price of gas by 2d. per 1000 cubic feet from June 30 last. The price would therefore be 2s. 6d.—the lowest figure, he believed, at which gas had ever been sold in Liverpool. This was ground for satisfaction; and he regretted it had not fallen to the lot of Sir Edward Lawrence, who was for so many years Chairman, and whose desire it was to see gas sold at 2s. 6d., to make this announcement. The question of the candle power of gas was occupying the attention of the public, and of directors of gas companies, very largely at the present time; and two distinct views were held on this as on most other questions. There was no doubt at all that the tendency throughout the country was to sell gas of lower candle power than that supplied in Liverpool. Those people who used a lower candle power seemed to prefer it rather than pay a bigger price for the higher candle power gas. By Act of Parliament, the Liverpool Gas Company were bound to supply 20-candle power gas; and they could not reduce this except by getting another Act, to obtain which was troublesome, and (unless it met with general approval and was not opposed) was also costly. The Directors were fully alive to the importance of the question, and had been making inquiries as to the proportionate numbers of ordinary flat-flame burners and incandescent burners that were in use in the district they supplied, and also as to the number of stoves, gas-fires, and other appliances in which gas was employed for heating purposes, and as to the number of gas-engines in operation. Generally they were trying to obtain all the information they could which would serve as a guide in forming a judgment on the question. They had also instituted a series of experiments to satisfy themselves, so far as they could, as to the relation that existed between the price of gas of various candle powers and the value which the consumer obtained in the light be secured by burning it. The Directors hoped to come to some definite conclusion as the result of their experiments; but at the moment they expressed no settled opinion on the subject.

Mr. James Lister seconded the motion; and it was carried unanimously.

The Chairman next moved that a dividend for the half year ending June 30 be declared of 5 per cent. on the ordinary consolidated "A" stock and 3½ per cent. on the 7 per cent. "B" stock of the Company.

This was seconded by Mr. Lister, and carried.

A vote of thanks was passed to the Chairman for presiding; and this concluded the business of the meeting.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Report and Accounts.

In the report which the Directors of this Company will present at the half-yearly general meeting on the 12th prox., they state that the accounts for the six months ending the 30th of June show that the prosperity of the Company was fully maintained. There was a decrease of £4085 in the receipts for gas, due entirely to the reduction in the price to 1s. 6d., 1s. 4d., and 1s. 2d. per 1000 cubic feet from the 1st of April; the quantity of gas sold being slightly in excess of the corresponding half of 1904. Bearing in mind the present inactivity of trade, the mildness of the winter months, and the economy effected in the use of gas by incandescent burners, which are being increasingly adopted, the Directors regard the result as quite satisfactory. The accounts show that the revenue from the sale of gas amounted to £100,026; rental of meters and stoves, to £7957; residuals produced £58,716; and the total receipts were £167,962. The expenditure on the manufacture of gas came to £91,637; on distribution, to £13,176; and on management, to £6079; rents, rates, and taxes came to £9345; and the total expenses were £121,671—leaving a balance of £46,291. The Directors recommend the payment of the usual dividends, which have been fully earned; and there is a balance of £3194 to be added to the amount brought forward from previous half years.

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held last Thursday at the Cannon Street Hotel, E.C.—under the presidency of the Chairman, Mr. W. G. Bradshaw.

The Secretary (Mr. H. D. Ellis) read the notice convening the meeting, and the minutes of the previous meeting; and the report and accounts were taken as read.

The Chairman: I now have the pleasure to move: "That the report and accounts be received, adopted, and entered on the minutes." We have only a small meeting to-day; but I always think a small meeting is a good sign. It means that the proprietors are well satisfied that affairs are in good order, and that the Directors do not need any special looking after. Therefore we may take the small meeting as a compliment. The interest of the past half year centres mainly round two points—the accounts submitted to you to-day, and the proceedings that have been taking place in Parliament. There is very little else which calls for your attention; and therefore I shall do my utmost to limit my remarks within a smaller compass than has been the case for the last few half years. It is always my endeavour to so put the condition of affairs before you that you may be able to form a fair and accurate judgment of the position and progress of the Company. I think this should always be the object of a chairman—of course, provided he does not say anything that will give competitors any advantages in their rivalry.

THE COMPETITORS OF GAS.

In former days, gas companies had very few competitors; but now it is different. The advent of electricity—especially if it is owned by the local authority, as is the case in our district—and the cheapness and abundance of mineral oil, have made it necessary that gas companies should sell at the lowest possible price, and make every effort to bring before the public in their districts the great advantages of gas for cooking, lighting, and heating purposes. As far as street lighting is concerned, I think we may say that the battle is won—that it is admitted on all sides that incandescent gas has proved its superiority over every other form of lighting. During the past half year there have been many proofs of this—not so much in our district, but in various parts of London. So far as stoves are concerned, the ever-increasing demand for them shows that in the popular estimation they are most convenient and economical; and a cheering feature is that gas-engines of large horse power are everywhere steadily superseding steam. These facts lead one to the conclusion—and a very happy one it is for us—that the gas industry has a great future before it.

INCREASED BUSINESS.

Of course, we always expect fluctuations in the amount of profit in any given half year, because gas companies are dependent upon so many changeable circumstances for their profits—such as the weather, the state of trade, the cost of coal, the value of residual products, and so on. But these variable features are not the factors to be looked at in estimating the position and progress of a gas company. Rather should we look at the amount of capital expended, the price charged for gas, the number of consumers added to the books, and the volume of business transacted. In every one of these ways I am happy to-day to be able to give you a most satisfactory report. We have gained 193 ordinary consumers in the half year; and we have added 3544 stoves and 4393 coin meters. We have sold 6½ million cubic feet of gas, or about 0·5 per cent., more than in the corresponding half of last year; and a satisfactory point about this is that the increase has taken place in the last three months. The first three months of the year were very mild. There was really no winter at all; and the consequence was that the sale of gas fell off considerably. During the last three months of the half year, however, we have had a very good increase indeed. The Gaslight and Coke Company had a falling off in their sales for the half year of nearly 2 per cent., while the South Metropolitan Gas Company had an increase of a little more than 1 per cent. So that, comparing ourselves with our neighbours, we have done very well in that respect. Another satisfactory thing is that the consumers have taken a very large part of the new issue of stock—which shows that they believe in the Company and the continued usefulness of gas.

THE FLUCTUATION OF PROFITS.

In the accounts you will see an example of the fluctuations of profits to which I have just alluded. Like other companies, we have not earned so much during the last six months as in the corresponding period of the previous year. Then our net profit was £60,434; whereas this last half year it was £55,717. That is a falling off of £4716. Last year we had a surplus of £2286; now we are short by £3231, £800 of which is due to the dividend on new issues of stock. This result is not in consequence of any falling off in our business or prosperity, but it is mainly owing to two causes. First of all, we have been selling gas 1d. per 1000 cubic feet cheaper. This would have cost us £6020, if we had not sold a larger quantity. It actually cost us £4912, or more than the difference in the amount of profit. The second cause is the smaller receipts from the residuals. These show a diminished return of £6688. Coke was responsible for a loss of £9133, although we actually sold 4618 tons more than in the corresponding period. The other residuals, however, came a little bit to the rescue; for breeze, tar, and sulphate gave an increased return of £2445. There are other small items which account for £1005 less profit. On the other hand, we find stoves and meters, owing to the larger number on hire, have given an increased rental of £2789; while coals and oil cost less by £5100. In the latter item is a satisfactory saving in the matter of carriage of coals from the North, owing to our having our own steamers. If all these figures are taken into consideration, the diminished profit will be accounted for.

THE NET REVENUE AND CAPITAL ACCOUNTS.

Just to show the effect of this on the position of the Company, if you will turn to the net revenue account you will see that we brought forward at the beginning of the half year £19,471. When you add the profit of the half year and deduct interest on the debenture stock and temporary loan, you have left £67,013. We propose to recommend the payment of a dividend at the same rate as during the last few half years—that is, £5 4s. per cent. per annum upon the 4 per cent. stock, and 5 per cent. per annum upon the 3½ per cent. stock. This will absorb £50,773, which will leave us with £16,240 to carry forward. Of course, I should like to have seen the carry forward increased rather than diminished; but, under all the circumstances, I am very satisfied. As to the capital account, we have spent £26,734 during the half year, all of which, with the exception of £4075 which mainly went to the new carbonizing house at Stepney, was for additional meters and stoves, and for supplying and fixing service-pipes necessary to carry the gas to them.

THE PROFIT-SHARING SCHEME.

There is one item in the revenue account to which I should like to call your attention—that is, the £2917 for profit-sharing. The sum is £463 more than in the corresponding period of the previous year. The reason is that the bonus varies in accordance with the price of gas. We have reduced the price 1d.; and therefore the bonus goes up ½ per cent. The employees have been receiving 5½ per cent., instead of 5 per cent. Of this fact, I am very glad. So far as the Company is concerned, the scheme has done all for it that we expected, and more. It has given the men an interest in their work, and an incentive to energy and economy, which perhaps nothing else could have given them. I am pleased to be able to bear testimony, on the authority of the Engineer and Manager, that the conduct of the men has been excellent, and that the good feeling between men and masters is all that one can desire. I believe the men really appreciate our service, and would be loath to exchange it for any other. I have been told that it is quite a common saying in the district that Commercial employees never retire and never die; and this seems an indication that the men are contented and well cared for. But I must add that the profit-sharing scheme has not done all for the men that we anticipated it would do. You know one-half of the bonus is invested in the names of Trustees, and is only paid over in the event of men leaving the service or dying, or having sufficient to their credit to warrant the issue of a separate stock certificate in the name of the individual. The other half is withdrawable at any time. But the men have been warned all along that the object of the Directors in asking you to accord them this bonus was that they should make provision for old age or to meet those unforeseen emergencies which come upon all of us at some time or another; and that we do not regard the withdrawable half of the bonus as available for the ordinary requirements of life. Now, I regret to say—and it is a sincere regret—that an increasing number of men have given notice of their intention to withdraw this half of the bonus; and we have had under serious consideration what steps we ought to take to remedy what I cannot help calling this evil. We have talked the matter over with the Profit-Sharing Committee; and at their request, we are going to have meetings with the men to discuss the situation. We do very earnestly desire that the men should take full advantage of the opportunity which your generosity has given them of laying by something for old age and of becoming holders of property, so that they may have a stake in the concern and a stake also in the country. I have said what I have said, because the subject is one that is near to my heart and those of my colleagues; and I have every confidence that the men will receive what we have to say in a spirit of friendliness, and will pay heed to it. I hope it will not be necessary to take any other step.

THE BURDEN OF THE RATES.

With regard to the question of the rates, I cut out from a newspaper last night some figures from the Annual Statistical Abstract just published. From these, it appears that the indebtedness of the Local Authorities in the United Kingdom has gone up in ten years from £265,000,000 to £442,000,000—an increase of £177,000,000. The National Debt in the same time, in spite of the South African war, only grew from £667,000,000 to £798,000,000—an increase of £131,000,000. That is to say that, while the whole nation's indebtedness has increased £131,000,000, the indebtedness of the Local Authorities has gone up £177,000,000. This shows how it is that rates are increasing by leaps and bounds all over the kingdom. I do not want to go into the subject at any length to-day, because I dealt with it at the last meeting; but since that time an Association has been formed in our district, which is called the Poplar Borough Municipal Alliance, and whose object is said to be to scrutinize the local expenditure of public moneys, with the view of preventing wasteful or illegal outlay. I can only say that if the Society is wisely conducted, it is likely to do a very great deal of good, and that it is much needed. Appended to a circular which they have issued is a table classifying the rateable value of the three parishes of Poplar, Bromley, and Bow, from which it appears that the rateable value of the whole of the three parishes amounts to £816,591. Of this, £429,811, or considerably more than one-half, is in respect of the property of dock, railway, gas, water, and other public companies, public buildings, factories, and warehouses. I want to point out the injustice that, in respect of all this property, the owners have no voice (except perhaps in the case of a few of the factories) in the election of those who spend the rates, and have no power of control at all. That is not right; and sooner or later a remedy must be found.

THE PARLIAMENTARY WORK OF THE PAST SESSION.

My last word must be a short statement of the parliamentary proceedings for the half year. At the last meeting you authorized us to promote a Bill in Parliament with the other two Metropolitan Companies to give effect to the recommendations of the Departmental Committee of the Board of Trade, who had been sitting to consider the testing of gas for illuminating power and sulphur impurities. I said we agreed with all the recommendations with the exception of the one with regard to testing for illuminating power, to which we strongly objected. I also said that the London County Council were promoting a similar Bill which contained a clause giving effect to the objectionable illuminating power clause, and another reducing the standard price of all three Companies by 1d. Both Bills came before a Select Committee of the House of Commons; and this

Committee absolutely refused to review—or, indeed, to consider—the report of the Departmental Committee, and we could not get them to depart from it a hair's breadth. But we did get the London County Council to withdraw the clause regarding the reduction in the standard price. The result was that our Bill was rejected, and the County Council Bill was modified in the way mentioned. When we went to the House of Lords, we succeeded in convincing a very strong Committee as to the unfairness—I may say the absurdity—of the proposal of the County Council as to testing for illuminating power; and after a long and hard fight, it was enacted by agreement that—

> The Gas Referees shall from time to time prescribe the burner for testing the illuminating power of the gas supplied by the company, and the chimney (if any) to be used with such burner. The burner so prescribed shall be of such a pattern (not being an incandescent or similar burner) as shall be practicable for use by the consumer; and the burner and the chimney shall be the most suitable for obtaining, and in making the test shall be so used as to obtain, from the gas when consumed at the rate of 5 cubic feet per hour the greatest amount of light.

This clause re-enacts an almost precisely similarly clause in the City of London Gas Act, 1868; and it restores to the Gas Companies (and I think I may say to the gas industry throughout the kingdom) a principle that we have always maintained is our right—that the gas, when tested for illuminating power, shall be burned to the best possible advantage. Of course, we are not quite satisfied that the fixed rate is the best possible method of burning gas, because it involves the use of a separate burner for different qualities. But we have substantially had justice done to us; and therefore I am not disposed to be too critical. The other main features of the Act are: First, that an average of three days is to be deemed the illuminating power of one day. Secondly, tests are instituted for calorific power and also for illuminating power with flat-flame burners, for information only, and without penalties. Thirdly, the test for sulphuretted hydrogen is modified, and there is to be no penalty for the presence of other sulphur impurities in the gas. Thus after many years' hard fighting, the unnecessary and useless restrictions that have harassed the manufacturers of gas, and vexed and worried managers, have at last been removed; and I trust that for many years to come expensive parliamentary proceedings will not again be necessary.

THE METROPOLITAN COMPANIES IN ACCORD.

It is worthy of placing on record that, for the first time, the three Metropolitan Gas Companies have stood shoulder to shoulder in a long fight; and, at the cost of many mutual concessions, they have maintained their alliance. As the result of this alliance, justice has been done; and the removal of the burden will, I am sure, inure to the great advantage of consumers of gas in the Metropolis. I would like to acknowledge the courtesy with which the Chairmen of the other two Companies—both my seniors in years and experience—have met us on all occasions, and the way in which they have admitted us, the representatives of a smaller Company, to an equal voice in the conduct of the parliamentary proceedings.

WHERE THANKS ARE DUE.

I would also like to state the great indebtedness which we feel to Mr. H. E. Jones for his help, and especially for the evidence which he gave in the House of Lords; for it was mainly his evidence which led the Committee to take a reasonable view of the test for illuminating power. Of course, the Committee had been already greatly influenced by the evidence of Sir George Livesey; and in my opinion we owe to these two gentlemen the fact that the parliamentary proceedings have been so satisfactory as is the case. I know you will be as grateful to them as we are. (Applause.)

THE REPORT ADOPTED.

In conclusion, I may congratulate you on the position and prospects of the Company.

The Deputy-Chairman (Mr. Walter Hunter) seconded the motion, and in doing so remarked that he had been present at the whole of the proceedings in Parliament, and entirely endorsed the great indebtedness they must all feel to Sir George Livesey and Mr. Jones for the way in which they put the case before the Committee.

The resolution was then carried unanimously.

THE DIVIDEND.

The Chairman next proposed the payment of dividends at the rates of £5 4s. per cent. per annum upon the 4 per cent. stock, and of 5 per cent. per annum upon the 3½ per cent. stock, both less income-tax. He pointed out that these rates were 2s. 8d. per cent. on the 4 per cent. stock and 3s. 4d. per cent. on the 3½ per cent. stock less than they were entitled to, and that this represented a sum of £1409, of which they were making a present to the consumers.

Sir George Livesey remarked that the public authorities said that the Gas Companies thought only of themselves; but, as a matter of fact, the three Metropolitan Companies had been selling gas at a lower price during the last twelve months than they could afford to if they were to make both ends meet. He thought this was very strong proof that they were trying to sell gas at the lowest possible figure. They were none of them paying the full dividend to which they were entitled, because they had not earned it.

The Deputy-Chairman seconded the motion, and it was adopted.

VOTES OF THANKS.

The Chairman, in moving a vote of thanks to the officers and employees, said he was always glad to bear testimony to the zealous service which they gave the Company. The work and feeling throughout the Company was everything that could be desired; and he had the greatest pleasure in proposing that they be thanked for their willing and zealous services during the past half year.

The Deputy-Chairman seconded the motion.

Mr. H. E. Jones said that, at the risk of being a little irregular, he wished to support the vote. The past year had unfortunately seen the death of some of the Company's oldest and most valued officers, who enjoyed their pensions for only a few months. The young staff could take no higher example to follow than that which they would find in the records of these veterans, who had stood by his side for 35 years, doing work which was made unnecessarily severe by those parliamentary limitations which had just been removed, and for the removal of which they were indebted to an extent which no language of his could exaggerate to Sir George Livesey. All gas officials everywhere would for all time in future respect and reverence the traditions of Sir George, and the splendid battle that his tenacity, courage, and foresight had enabled him to fight for so many years, and to win at last. The five men who had been taken away by death were Messrs. Cross, Favert, Danzleman, R. Smith, and D. Foster. He did not hesitate to say that the harassing restrictions to which they had hitherto been subjected, while they did not much interfere with the dividend, had been the means of shortening the lives of some of the men to whom he had referred. He could not let this occasion pass without bearing testimony to these men, who laid some of the foundations of which the shareholders were now reaping the benefit. The Company had a splendid staff—young, energetic, and strenuous; and if they followed the example of these other men—humble though some of them were—they would not fail in their mission in life.

THE LIABILITY FOR FORGED TRANSFERS.

The vote having been accorded,

Mr. Ellis returned thanks on behalf of himself and the clerical staff. He said he must mention a matter which concerned the shareholders very deeply. It was just two years ago that he referred to a very important law decision—the case of *Mayor and Corporation of Sheffield v. Barclay and Co.*, in which a decision against the Corporation had been delivered by the Court of Appeal. This was a most important case affecting all companies and corporations who issued registered stock. He ventured on that occasion to express the hope that the case would be carried to the House of Lords, and the decision reversed; and he had now the pleasure of announcing that the judgment had been reversed by the House of Lords, so that they might breathe freely as a Company. It was no light peril from which they had escaped. Had the decision been otherwise, it would have imposed upon them a most intolerable and inequitable responsibility, and risk of loss, against which no care or prudence or foresight on the part of Directors or officers could guard. At any moment they might have had an enormous claim for compensation in regard to matters over which they had no control; and it might even have gone to the extent of imperilling the dividend. Happily now the House of Lords had established justice and equity; and this he hoped would remain the law of the land for all time to come. They had been indebted to the House of Lords for many wise and beneficent measures and decrees; and this case had furnished one more instance. Therefore he, for one, said with heartfelt gratitude, "Thank God we have a House of Lords."

Mr. S. H. Jones, replying for the engineering staff, remarked that if he might add a word to what his predecessor and father had said about the old servants of the Company, it would be that he could only feel deep regret that they did not have the relief which the younger staff would enjoy in the future in regard to testing.

A vote of thanks to the Board concluded the proceedings.

BRISTOL GAS COMPANY.

The Half-Yearly Meeting of the Company was held last Thursday, at the Offices, Canon's Marsh, under the presidency of the Chairman, Mr. J. W. S. Dix.

The report of the Directors stated that, notwithstanding the reduction in the price of gas (representing a reduction in revenue of about £30,000 per annum), the unusual mildness of the season, and the large extension of incandescent lighting, the result of the working for the half year to June 30 was most satisfactory. The credit balance of the profit and loss account was £67,513, which, after payment of the six months' dividend, allowed £39,451 to be carried to the credit of the next account. The Directors recommended the declaration of a dividend at the rate of 5 per cent. per annum.

The Chairman, in moving the adoption of the report, foreshadowed that at the next meeting he should consult the shareholders as to the desirability of not holding two meetings a year. So long as they obtained their dividend, he thought they would rather welcome such a change. Regarding the report, the Directors were pleased to put before them such a satisfactory one. Considering the reduction in the price of gas during the last half year, he thought the statement of accounts spoke wonderfully well for the prosperity of the concern. Some people regarded the Directors as rather venturesome in making the reduction; but he thought the report would be a condemnation of them if they had not made the reduction. The business of the undertaking continued to increase. In 1904, the number of meters was 39,975; whereas at present the number was 43,152—an increase of 3177. Prepayment meters had gone up from 10,136 to 12,443—an increase of 2307; and cookers had increased from 25,321 to 28,707—3386 more. Two additional miles of mains had been laid; the length now being 348 miles. Public lamps had gone up from 8824 to 9139, in spite of electric light; and there had been made 10 million cubic feet more gas. He did not want to tread on the toes of those who favoured electric lighting; but he wished to put before them a few facts. Over 1200 gas-lamps had discontinued consuming gas, equal in amount to £3100 per annum. Last year the electric lamps which displaced gas cost the city £9900, showing an excess over gas of £6800 per annum, in addition to capital expenditure. Had incandescent gaslight been used, the difference in price would have been larger. Should the authorities, in their wisdom, or unwisdom, displace the rest of the gas-lamps, and adopt electric lighting for the whole of the city, the extra cost—calculating at the same rate as the present installation—would, in addition to the above, be £34,000 per annum, or a total of £40,800 per annum. This was a matter for the ratepayers to watch.

Mr. G. K. Stothert seconded the resolution, which was adopted.

On the proposition of the Chairman, seconded by Mr. Stothert, a dividend at the rate of 5 per cent. per annum on the nominal capital of the Company was agreed to.

TOTTENHAM AND EDMONTON GAS COMPANY.

The Ordinary Meeting of this Company was held on Saturday, at the Chief Offices, High Road, Tottenham—Mr. CORBET WOODALL in the chair.

The SECRETARY (Mr. James Randall) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

PROGRESS AND GAS CONSUMPTION.

The CHAIRMAN, in moving their adoption, said such observations as he had to make would take their tone from the first paragraph of the report, which spoke of progress. The past half year had not been a particularly favourable one for gas companies. A mild winter was, one might fairly suppose, a blessing to the community; and, this being so, they must not grumble if it was not helpful to their industry. The demand for gas was less, both for lighting and heating, relatively to what it otherwise would have been, and so also was the demand for coke for domestic fires. In the corresponding half of 1904, their increased output was 17 per cent., as against 8 per cent. in the half year just closed. The comparison was not complicated by any question of electrical competition; and, so far as he was aware, the development of the district was proceeding as rapidly as ever. The explanation was therefore to be found only in the warmer weather to which he had referred, and, in a smaller degree, to the general adoption of more economical methods of burning gas. This latter cause had the complete sympathy of the Directors, and he had no doubt of the proprietors also; and it had been stimulated, as far as possible, at considerable cost to the Company. They felt that, to give the needed supply at the lowest possible charge to the consumer, was one of the best means of ensuring the permanent prosperity of the Company. But although the increase in gas sold was not so large as in some former periods, it was yet remarkably good; and when gauged by the number of new consumers and of apparatus issued for the employment of gas, it was worthy of their best records. They had had so many consecutive mild winters that there was danger lest they should count on the continuance of them, and be caught insufficiently prepared, for if a really severe winter did come now, it would certainly bring such an increase as would be without precedent in the history of the Company.

INTEREST ON FUND INVESTMENTS IN THE WORKS.

There were a few items in the accounts which called for notice. For the first time, there had been charged against net revenue, interest upon such portion of the reserve and insurance funds as had been employed in the business of the Company. He had felt, so far as these funds were not invested outside the Company, but were used in relief of capital, that they should contribute to the respective funds at least as much as they would otherwise earn; and, his colleagues agreeing with him in this view, the appropriation had now been made.

MANUFACTURING COSTS AND THE NEW WORKS.

Regarding the manufacturing figures, they had not yet reached the limit beyond which they might not hope for further improvement. But at the same time they had done well; and he believed in the near future they would do better. They had paid rather more per ton for coal than in the corresponding half year; but having sold more gas per ton, the cost per 1000 cubic feet was less. When, however, they brought residuals into account—coke and the other residuals—prices had been so low that the net cost of coal was greater by 1d. per 1000 cubic feet, or about £2000. Oil, of which they used a large quantity, had been cheaper. Wages, on the other hand, had cost more by reason of their having had to use, during alterations, the retort-settings which were wholly worked by hand. The profit earned had been equal to 7d. per 1000 cubic feet, which was slightly more than was required to pay dividend and interest. The expenditure upon maintenance and renewals of plant had been high, but not appreciably more than in preceding years. The proprietors knew the view the Directors held upon the question of the depreciation of plant and apparatus of a perishable character; and their practice in this direction was not likely to be varied. At the same time, this charge would almost certainly be a diminishing one after the current year. The new works were making progress; but not so rapid as the Directors had hoped, and had a right to expect. The plant was essential to the efficiency of their supply next winter; and they were urging the Contractors to greater diligence. He (the Chairman) hoped that the summer meeting next year would be held at the gas-works; and that the proprietors would be pleased with the result of the great extensions of which they saw the commencement on the occasion of their last visit. He was glad to say that in the district, which covered an area of about 15¼ square miles, they had a supply absolutely efficient without exception.

AUTOMATIC STREET LIGHTING.

He might mention that they were engaged in an interesting experiment in the automatic lighting of street-lamps. About 400 lights in the neighbourhood of the office had been fitted with an apparatus invented by Dr. H. Rostin, and so far they were working very well indeed, although they had only recently been completed.

CAPITAL, NEW WORKS, AND A FURTHER APPLICATION TO PARLIAMENT.

The sale of additional stock which they had made during the half year was to the Directors very satisfactory. It was considerably more than subscribed; and it realized a small amount of premium. The authorized capital was now nearly expended; and it would be necessary shortly to apply to Parliament for power to issue an increased amount. They were also approaching the time when the land on which the Company were authorized to build works would be fully occupied. In view of this contingency, the Directors had made arrangements, which were practically complete, for the purchase of a considerable estate in the neighbourhood of the gas-works; and Parliament would be asked to authorize the use of the land for further works extensions.

AN ELECTRICITY CONTRACT.

Just before coming into the room, he heard that the Urban District Council of Tottenham had come to an arrangement with an Electric Power Company to take over the right to supply electricity in the district. It was not for the Gas Company to criticize the action of the District Council for a moment, but he noticed one of the conditions in the agreement provided for the lighting of a certain number of roads with electric arc lamps, at a price which was named. It was worth mentioning that the total amount paid by the Tottenham District Council for the efficient lighting of their whole area—roads, streets, alleys, and lanes, was about £4600; and, so far as he could make out, the lighting of a comparatively small length of the more prominent streets would cost the ratepayers something over £2000. He did think that one might express regret, at any rate, that in Tottenham there should be a disposition to replace gas by electricity when the City of London was setting the example of replacing electricity by gas. Whatever might be said in favour of electricity in certain applications for lighting, he thought that every month demonstrated the fact that for the lighting of streets, neither in efficiency nor cost, could electricity, if he might be allowed to use the phrase, "hold a candle to gas." He also regretted that it was proposed to make the contract for a long term of years, because he thought the Council, through the Gas Company, could obtain more satisfactory lighting for less money than that afforded by electric arc lamps.

Mr. GERALD T. WATSON seconded the motion, and it was unanimously carried.

DIVIDEND AND RE-ELECTIONS.

Mr. HENRY BAILEY moved the declaration of a dividend on the "A" consolidated stock at the rate of 6¼ per cent. per annum, and on the "B" stock at the rate of 4⅜ per cent. He said he thought the proprietors might congratulate themselves upon being able to pay the full dividend to which they were entitled, especially in view of what other companies were doing. He did not say gas companies, but business generally in London was not particularly flourishing; and he thought the Tottenham Gas Company were doing well in paying the ordinary dividends.

Mr. JAMES CLOUDSLEY, J.P., seconded the motion, which was agreed to.

Moved by the CHAIRMAN, and seconded by Mr. LANG, Mr. Bailey was re-elected to his seat on the Board, as was also Mr. D. Ford Goddard, M.P., on the proposition of the CHAIRMAN, seconded by Mr. A. W. OKE.

Proposed by Mr. LANG and seconded by Dr. SCOTT, Mr. Edward Crowne, the retiring Auditor, was reappointed—the CHAIRMAN, in this connection, remarking that the Directors cordially welcomed Mr. Crowne's inspection of the accounts of the Company, not merely because of his capacity as Auditor, but also in his capacity of Clerk to the District Council. The Directors felt, when the appointment was made, that they could hardly have given better evidence to the local authorities of the district that at any rate there was nothing in the Company's accounts that they desired to keep from their cognizance.

VOTES OF THANKS—THE PROSPECT OF A REDUCTION.

Mr. W. E. TOYNTON moved a hearty vote of thanks to the Directors for the zeal they had bestowed on the management of the Company's affairs during the half year. He said he was sure, from the report they had heard that day, that the proprietors could wish for nothing better; and it was only by the devotion of the Board to the business that they were in the position of receiving such a genuine report. The constitution of the Board was all that it should be for a gas company. Upon it they had both the local element and the professional element. They knew that in their Chairman they had a gas engineer of the highest rank, and as an administrator he was not to be equalled. This he thought was one of the great reasons why the Company was in its present position.

Mr. R. S. KEYS seconded the motion.

Mr. OKE, in supporting it, remarked that one of the reasons why the increase of consumption had not been quite so large was the prevailing depression in the country; and that depression all gas companies were feeling. Fortunately for the Tottenham Company, they were not in the position of many other trading companies, inasmuch as they were able to declare and maintain a dividend larger than a year or two ago.

The proposition was heartily agreed to.

The CHAIRMAN, in his response, said he must confess that the Directors looked forward to this vote, but they did not look for the extremely complimentary remarks that were made by Mr. Toynton. They, however, did very much desire to feel and to know that they had satisfied the expectations of the proprietors. It was a great pleasure for him also to be able to say that the Board were admirably supported by their officers. When he (the Chairman) was previously speaking, he did not say anything about the present or immediate future. He had no doubt at all as to the probability of the business continuing to increase at least as rapidly as it had done in the immediate past; and although he was not in a position to say anything definite with regard to a reduction in the price of gas, he need not say they hoped the period was not remote before they would be able to announce one. In proposing a vote of thanks to the Secretary and the Engineer and their respective staffs, he said the works, when the proprietors inspected them would, he thought, satisfy them that an immense amount of energy, skill, and attention had been bestowed upon them by Mr. Broadberry, especially during the past twelve months; and he (the Chairman) had no doubt that in the near future they would see in the improved records of the working the fruit of this expenditure and labour. As to Mr. Randall, he never quite knew how to express all he felt regarding him and his work. The only thing he was ever disposed to find fault with him for, and he found fault with him for it over and over again with absolutely no effect, was that he would not spare himself and take rest.

Mr. J. L. CHAPMAN seconded the motion, which was unanimously carried.

Mr. RANDALL, in returning thanks, remarked that the proprietors had heard the high commendation paid him by the Chairman, and he

thanked him for it; but the greater part of it he must give to the staff working under him.

Mr. BROADBERRY also replied on behalf of himself and his staff. He added that Tottenham had, all through his life, been his field of work. He entered the Company's service 26 years ago, as an apprentice; and the Directors had from time to time shown their confidence in him by promoting him from post to post, until at last they did him the honour of putting him in the position he now held. He hoped it would be his privilege to work with the Directors for many years, and that they would carry on the Company from success to success.

WANDSWORTH AND PUTNEY GAS COMPANY.

The Half-Yearly Meeting of this Company was held at the works last Tuesday—Mr. H. E. JONES (the Chairman) presiding.

The SECRETARY (Mr. C. W. Braine) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ending the 30th of June, was presented. It showed a profit of £13,950 on the revenue account, and a sum of £17,578 available for distribution; and the Directors recommended dividends at the statutory rates of £7 15s., £6 5s., and £5 8s. 6d. per cent. per annum on the "A" and "B" consolidated stocks and the "C" ordinary stock.

The CHAIRMAN, in moving the adoption of the report and accounts, said the latter were the most satisfactory the proprietors had seen for some time, especially when they took into consideration the past mild winter, and the tendency on the part of the consumers to get the best means of light by the adoption of the Welsbach mantle. Residuals were not quite so good as in the corresponding period of 1904; but, putting it shortly, they had earned a net profit of £13,950, which was sufficient to pay the dividends and leave a margin of £1634. He would say that this was absolutely unique within the Metropolitan area. The reports of other Companies showed that the Gaslight and Coke Company had a decrease of nearly 2 per cent., the South Metropolitan and South Suburban Companies had an increase of rather over 1 per cent., and the Commercial Gas Company had an increase of ¾ per cent., while this Company's increase was over 4 per cent., and the adjoining Brentford Company had an increase of 5 per cent. In producing these results, he could assure the proprietors that the expenses and the upkeep of the works had been well looked after. The capital, too, stood at a low figure. With reference to the question of purification, the Company went to Parliament in 1900, and, falling in with the general ideas of making gas in London then obtaining, they had to accept certain provisions as to purification by lime, which was a troublesome, changeable, fickle, and inconstant means of purification. No illustration he could give them would convey to their mind the infinitesimal form of sulphur which they had to get rid of, and which was discovered by a certain professor about thirty years ago. The trend of legislation at the moment was to reduce the purification for sulphur; and even pressure had been brought to bear by the London County Council themselves, which ought to make it go with satisfying force to all consumers and public bodies. Before the Company obtained their Act, the cost of purification was about ½d. per 1000 cubic feet; whereas it was now about ¾d. The extra farthing was as nothing compared with the unnecessary trouble, anxiety, and responsibility which in consequence fell upon the Directors and officers, whose efforts might be much better employed in many other directions and in the interests of the consumers. There was always the chance of the Company being brought face to face with the Police Court for any excess of sulphur, as though they had committed a great wrong. While on the subject of purification, he would like to mention the persistent courage and efforts of Sir George Livesey, the Chairman of the South Metropolitan and South Suburban Gas Companies, who, in the first place, had fought this question almost single handed. He (the Chairman) thought the whole gas community owed Sir George Livesey a signal debt of gratitude for his efforts in the matter of the abolition of lime purification, which would relieve gas companies from a very onerous position. He wished to call the shareholders' attention to the fact that at meetings held recently by two great Railway Companies it was mentioned that a good deal of money was not now earned by them for carrying coal to London, owing to the very general adoption by the public of gas for cooking their food and heating their rooms. It should be this Company's policy to provide everybody with gas for power purposes. Recently a scheme promoted in Parliament proposed to supply electrical energy at ¾d. per horse power. He should like to tell them that if they reduced their charge for gas by only a very little, they would be capable of supplying gas for power at about ½d. per horse power. There was no necessity to tear up the streets for the purpose of laying down electric mains, causing a nuisance generally, more especially as, with the possible reduction mentioned, gas could be supplied at (say) 100 cubic feet for 2½d.; being sufficient for 4-horse power. He thought all gas companies would shortly make the question of cheap power gas one for their earnest consideration, as there was no need to look to a large electric company for the purpose of getting cheaper power. He hoped that at no distant date they would be enabled to make a substantial reduction in the price of gas, which would mean a saving to the consumers of more than £3000 per annum. There had been an increase of 600 consumers, 476 of whom were on the coin-meter principle; and 1000 cooking-stoves had been added in the half year. A sale had recently taken place of £15,000 of stock, which sold at an average price of 115½, giving as an investment £4 14s. per cent. per annum.

The DEPUTY-CHAIRMAN (Mr. T. A. Ives Howell) seconded the motion, which was carried.

Dividends at the rates recommended in the report were declared.

The CHAIRMAN, in moving a vote of thanks to the Secretary, Engineer, officers, and workmen, spoke of the good feeling and loyalty which prevailed.

Mr. H. S. FREEMAN, in seconding the motion, said that the working during the period under review had been excellent. He heartily congratulated the Engineer (Mr. H. O. Carr) on the results obtained.

Mr. BRAINE and Mr. CARR having suitably replied,

Mr. OKE moved a vote of thanks to the Chairman and Directors of the Company. He said the shareholders had always had good reports presented to them; and they felt that everything possible had been done in the interests of the Company. They received an excellent dividend, the shares were rising in the market, and there was an increase in sales of gas. He spoke in favour of having a simpler method of purification, and said that supplying gas for power purposes at a cheap rate was the best way of competing with the huge monopoly which had been mentioned by the Chairman.

Mr. J. HENNELL seconded the motion, which was carried unanimously.

The CHAIRMAN shortly replied for his colleagues and himself, and the meeting closed.

CROYDON GAS COMPANY.

The Half-Yearly Report and Accounts.

The report which the Directors of this Company will present to the proprietors at the half-yearly meeting on Friday, opens with the statement that in the six months ending June 30 there was an increase of 2·35 per cent. in the sales of gas, compared with the corresponding period of 1904. The number of consumers was augmented by 1104, and 1085 additional stoves were let on hire. The Bill promoted to sanction the amalgamation of the respective undertakings of the Company and the Caterham and District Gas Company received the Royal Assent as the "Croydon Gas Act, 1905," on the 30th of June; and as from Midsummer the price of gas supplied by the latter Company has been reduced to 3s. 4d. per 1000 cubic feet, or an average reduction of about 5d. Under the provisions of the Act, the ordinary shares of the Caterham Company have been converted into a like nominal amount of "E" stock with a maximum dividend of 10 per cent., and the 5 per cent. preference shares into a like amount of "D" stock, with a maximum dividend of 5 per cent.

The accounts accompanying the report show that £17,908 was spent for capital purposes during the half year, about £10,600 of it being for new buildings and plant, and £6000 for new mains and services. The total capital expenditure at the close of the six months amounted to £509,667, or £9696 more than the receipts. The revenue was £88,026, compared with £89,915 in the first half of 1904; the expenditure being £69,828, against £67,841. The balance carried to the net revenue account is £18,198, compared with £22,074 this time last year; and the sum available for distribution is £22,287, against £23 018. The Directors recommend dividends at the rates of 14½, 11½, and 10¾ per cent. per annum on the three stocks of the Company, all less income-tax. The payment of these will absorb £18,299, and leave a balance of £3988. Under the provisions of the above-named Act, the ordinary shareholders of the Caterham Company will be paid a dividend at the rate of 9 per cent. per annum, less income-tax, out of the profits of that Company for the half year.

The working statements in the accounts show that, under the supervision of Mr. James W. Helps, M.Inst.C.E., the Engineer and General Manager of the Company, 31,145 tons of coal, 10 tons of cannel, and 573,581 gallons of oil were employed in the manufacture of 519,132,000 cubic feet of gas, of which 475,809,700 cubic feet were sold and 481,819,200 cubic feet accounted for. The estimated quantities of residuals made were: Coke, 18,693 tons; breeze, 5807 tons; tar, 447,631 gallons; and ammoniacal liquor, 884,703 gallons. The make of sulphate of ammonia was 324 tons.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

A Good Year with Reduced Prices at Bridport.

Notwithstanding that the past year's working of the Bridport Gas Company had to bear a reduction in the price of gas from 4s. to 3s. 9d. per 1000 cubic feet, and to 3s. 3d. for gas used for engines, together with a falling off in the consumption owing to depression in the staple trade of the town, the accounts presented at the ordinary general meeting last Tuesday showed a profit of £1331 on the revenue account, compared with £1248 for the year ending June 30, 1904; the amount available for distribution being £1674, against £1511. This enabled the Directors to recommend the payment of 8 per cent. dividend on the ordinary shares, free of income-tax, and 5 per cent. on the preference shares, less income-tax, which would leave £568 to be carried forward. The Engineer and Manager (Mr. W. H. Reed) sold 138 cubic feet more gas per ton of coal carbonized than in 1903-4, and there was an all-round increased sale per ton in residuals—1 cwt. more coke, 1·4 gallons more tar, and 5·3 lbs. of sulphate of ammonia.

Steady Increase at Maidstone.

At the annual general meeting of the Maidstone Gas Company last Thursday, the Directors reported a balance of £12,790 available for distribution, as the result of the working during the twelve months ending the 30th of June; and they recommended the declaration of a dividend, less income-tax, at the rate of £7 12s. 6d. per cent. per annum, of which £3 16s. 3d. per cent. had been paid as an interim dividend on the 1st of March. They stated that the extension of the mains to Bearsted had been completed, and the results had been satisfactory. The Company had taken advantage of the power given in their last Act of Parliament to extend their limits of supply to Hollingbourne and Leeds; and on the 1st of July last they completed the purchase of the whole of the undertaking of the Hollingbourne Gas Company. They added that the business generally had continued to show a steady increase; and that the works, plant, and mains had (under the supervision of Mr. H. J. Smythe, the Company's Manager) been kept in good working order and condition. The Chairman (Mr. George Marsham, J.P.), in moving the adoption of the

report, laid stress upon the remark as to the condition of the Company being one of steady progress. They had made sufficient profit, after making all allowances for depreciation of meters, stoves, and fittings, to pay the maximum dividend under the sliding-scale—viz., £7 12s. 6d. per cent. for the year. As a proof of the Company's steady progress, he gave the following figures: The gas consumed showed an increase of 8 million cubic feet; the number of customers was 3302 ordinary and 4633 slot, the increases for the year being 143 and 743 respectively; number of cooking-stoves, 5196, an increase of 541. He went on to say that the quantity of gas unaccounted for had decreased from 5·99 to 5·36 per cent. They had now had two years' experience of the reduced illuminating power—14 instead of 15 candle gas—sanctioned by the last Act of Parliament; and the Directors and the public had every reason to be satisfied. The 14-candle gas was found to be as good, for lighting, heating, and motive power, as the gas of higher quality and price. The quality was maintained well above the legal standard; while the price in the borough, and within a radius of 1½ miles from the Town Hall, was 2s. 4d. per 1000 cubic feet; beyond that radius, 3s. 1d. The price for motive power was 2d. less—viz., 2s. 2d. and 2s. 11d. The Company had not only held their own in the borough, but had also extended their mains still farther into the rural parishes. These extensions had involved the raising of new capital; but he impressed on the shareholders that the Directors never undertook one until they were assured that the revenue would justify the outlay. There had been a large demand for the Company's new ordinary stock; it having been applied for nearly three times over, and at an advance of £6 on the price obtained last year. He referred to one other matter on which he said the Company were to be congratulated—viz., that, owing to the provisions of the new Act, it was an easy matter for the workmen to become small shareholders in the Company. This was, he believed, a good thing for them. It encouraged thrift, and gave them a good investment for savings; at the same time it tended to promote efficiency when their own workmen were personally interested in obtaining the best results of their labour. Among the new shareholders there were between 20 and 30 of the workmen; and he was glad to see several of them at the meeting. The staff had worked well and harmoniously; the plant was in good order; and everything was done by the Directors to keep things up to date. The report was adopted.

Good Working at Melton Mowbray.

The annual meeting of the Melton Gas Company, Limited, took place on the 11th inst., when the results of a very successful year's working were presented. It was a record make; and although the Company were hampered somewhat by the electric light, the increase in sales, and the decrease in the quantity of coal used, accounted for a very handsome profit balance. The carbonization of 2963 tons of coal produced 31,807,000 cubic feet of gas—an increase of 300 cubic feet per ton. Residual products were not so good, coke and tar being much lower in price than in the previous year; and, unfortunately, there was not much prospect of improvement. A dividend of 7½ per cent. was declared, and a balance of £340 carried forward. A unanimous vote of thanks was accorded to the Manager (Mr. G. R. Casterton) for his energy and attention during the year; and the hope was expressed that still better results would be shown.

Another Successful Year at Taunton.

At the ordinary general meeting of the Taunton Gas Company last Tuesday, the Directors were able to present, in their sixtieth annual report, evidence of another satisfactory year's working. The quantity of gas sent out in the twelve months ending the 30th of June was 91,271,800 cubic feet, and the amount of profit available for distribution was £6524, out of which the Directors recommended dividends of 5, 8, and 7 per cent. on three classes of stock and the yellow shares. This would absorb £3485, and leave a balance of £3039. As the reserve fund account could not be augmented, excepting out of moneys which would otherwise be payable as dividend, the Directors further recommended that sums amounting to 1 per cent. on the consolidated "A" stock and ⅞ per cent. on the yellow shares and new ordinary stock respectively, which sums might, under the Company's Act, at the reduced price of gas which had been charged for the twelve months, be declared as dividend, be transferred to the account named. These sums would amount to £425, and leave £2614 to be carried forward. The Chairman (Mr. Jonathan Barrett), in moving the adoption of the report, remarked that the output of gas for the past year was 3,678,400 cubic feet more than in the preceding twelve months, which he considered was very satisfactory. The motion was carried, and the dividends recommended were declared. The usual votes of thanks to the Engineer and Secretary (Mr. A. Edwards) and his staff, for their services on behalf of the Company, and to the Chairman for presiding, brought the meeting to a close.

Bad Trade and Municipal Competition at Wakefield.

The report presented to the shareholders of the Wakefield Gas Company, at their half-yearly meeting on Monday last week, showed that there was a balance of £9716 to the credit of the profit and loss account, out of which the Directors recommended the payment of a dividend at the rate of 11½ per cent. per annum on the £25 and £5 shares, at the rate of 9 per cent. per annum on the £5 "B" 5th shares, at the rate of 8½ per cent. per annum on the £10 shares, and 4½ per cent. per annum on the preference stock. The payment of this would leave a balance of £3335 to be carried forward. The Chairman (Dr. Statter, J.P.), in moving the adoption of the report and accounts, said there had been a reduction of £589 in the amount received from the sale of gas, which was due to bad trade, the spread of the incandescent gas-burner, and municipal competition. As the Company paid 1-29th part of all the rates in the city, it would be a bad day for the ratepayers in general if municipal trading damaged the business. There were now over 6000 automatic meters, from which had been received 785,415 pennies during the half year. The rental of meters and stoves continued to grow, and was a satisfactory indication of the vitality of the Company's business. The returns from residual products were no less than £1340 below what they were for the corresponding period last year, owing to the slump in the coke and tar trades. The Directors hoped, however, for the return of more favourable conditions. During the half year they had taken premises in the centre of the city for the purpose of a showroom, in which to bring their wares before the public, and show them effective modes of lighting both for indoor and outdoor purposes. The result had been so far satisfactory; but they hoped with the advent of the lighting season it would be even more so. The report was adopted, and the dividends recommended were declared. A vote of thanks having been accorded to the Chairman and Directors, Dr. Statter, in acknowledging it, proposed, and Mr. L. Moorhouse seconded, a vote of thanks to the Engineer (Mr. H. Townsend), the Secretary (Mr. W. H. Parker), and their respective staffs, which was suitably responded to.

Water.

Utilizing Water in South Essex.

At the ordinary general meeting of the South Essex Water Company last Wednesday, the Chairman (Mr. Courtenay C. S. Fooks), in moving the adoption of the Directors' report, stated that the Company had spent about £25,000 on capital account more than they had expended twelve months ago. Their receipts were £1200 more, and the working expenses were £640 less than they were in the first half of last year. The only unfortunate item in the accounts was that of rates and taxes; and this was a matter over which the Board had no control. If local authorities continued to spend money in competing with companies and private individuals in various matters, some of which were productive and some unproductive, he did not think the ratepayers could expect the rates to do other than rise. The balance carried to the credit of the half year was £12,811, against £10,976 in the corresponding period of last year. During the period under review, 886 new services had been added, representing an addition of £1666 to the annual revenue. The dividend recommended was similar to that of the previous half year. The Board continued their conservative policy of building up a reserve against contingencies. The sinkings both at the Roding and at the Ilford sites had been very successful. They had managed to sink their cylinders through the London clay and the quicksands, to the chalk. At the Roding site they had driven 5 feet into the chalk and were now getting 5 million gallons weekly from this source. They had laid several miles of 18-inch trunk mains north of Ilford and were pumping 1,900,000 gallons weekly which would have otherwise gone to waste. Mr. C. Charleton seconded the motion, which was adopted; and resolutions were passed approving the payment of dividends for the half year at the rates of 5 per cent. per annum, less income-tax on the preference capital, and of 8 per cent. per annum on the 1861 ordinary capital, 5·6 per cent. per annum on the 1882 ordinary stock, and 4 per cent. per annum on the 1901 ordinary capital, all free of income-tax.

GAINSBOROUGH GAS SUPPLY.

Reduction in the Charge for the Hire of Cookers.

At the Meeting of the Gainsborough Urban District Council on Monday of last week, the Gas Committee submitted a statement of accounts for the financial year that ended in March. The figures showed that less gas had been consumed by the larger users, through trade not having been so good, and other causes, but that there had been an increase in consumption for domestic purposes. The coal carbonized had been 7815 tons, and the gas made 81,454,000 cubic feet; representing 10,422 cubic feet per ton of coal, against 10,207 cubic feet last year. The year had been a record one as regarded the production of gas per ton of coal. The ordinary and slot consumers had increased by 86; and there were now upwards of 400 cookers fixed. The Committee recommended that the charge for the hire of these appliances should be reduced in accordance with a scale submitted, to take effect in the accounts for the quarter ending the 30th prox. The Council, in considering the report, came to the unanimous conclusion that though the year's record was not equal to last, owing to diminished consumption, the concern was in a very satisfactory state. The following resolution was passed: "That the accounts as presented be accepted and placed on the minutes; and the Council hereby express their gratification at the result, and their entire satisfaction with the management." We believe this satisfaction is thoroughly justified; the Gas Engineer and Manager (Mr. John Baldwin) keeping a watchful eye on every detail in order to ensure economical working. The effect of this has been that last year the consumers by ordinary meters were granted an extra 2½ per cent. discount, and meter-rents were reduced by something like 25 per cent. The present concession on cookers is equivalent to a gift to the consumers of about £70 per annum on the present number of users; and it is anticipated that it will still further popularize them.

Loan for the Mansfield Gas-Works.—The Gas Committee of the Mansfield Corporation have decided to make application to the Local Government Board for sanction to a loan of £15,000 for the general purposes of the gas undertaking, repayable within 40 years.

River Pollution by Water-Gas Tar.—In the course of the annual report of the Medical Officer of Health for Lewisham (Dr. A. Wellesley Harris), which has just been circulated, he refers at length to the pollution of the Rivers Pool and Ravensbourne by the admission of water-gas tar from the works of the South Suburban Gas Company. After detailing the various legal and other steps taken, Dr. Harris concludes as follows: "As a result of the judgment obtained, and the further evidence of pollution of which the Company received information, they took the necessary measures to remedy the nuisance. Important structural works were carried out by the Company, in order to prevent the offending products resulting from the manufacture of water gas gaining admission to the River Pool as it passes through their works; and we have reason to believe that there will be no recurrence of the nuisance."

SLOT MACHINES AND THE BRONZE COINAGE.

As a result of the introduction of penny-in-the-slot machines, there was a great scarcity of pennies a few years ago. This led to a larger production of bronze coins by the Mint; and the scarcity was followed by a superabundance. The issue was then greatly reduced, as shown by the following figures. The coinage of pennies, halfpennies, and farthings in 1902 was worth £148,499, whereas last year it was only £77,895. In the course of an interview with a representative of the "Daily Express," one of the Managers of the London and South Western Bank stated that they thought nothing of receiving at one of their City branches £100 worth of pennies in a week; the great producer of these coins being Peckham. He explained that the secret of this was the penny-in-the-slot gas-meter. "The South Metropolitan Gas Company's army of men who spend their time in emptying the pennies out of household meters bank the money at Peckham, and millions of pennies are poured into our branches in the Peckham district. At present we find the demand for big packets of pennies brisk," The Company have 182,000 of these meters; and the inspectors and collectors get round them once in about five weeks. It appears that it is quite a usual thing for them to take out 2½ million pennies in a few days. These coins have been locked up for five weeks in many cases; and if the emptying were allowed to stand still very long, a material difference would be made to the stream of coppers in circulation.

CROYDON IRONMONGERS AND THE GAS COMPANY.

The "Ironmonger" for the 12th inst. contained the following "Draft Heads of Suggested Arrangements with Local Tradesmen" which were submitted to the Central Board of the Ironmongers' Federated Association at a recent meeting.

Sale of Gas Appliances other than Cooking or Heating Stoves.—The Company to undertake that the price they would charge when selling to consumers any gas appliances other than cooking or heating stoves should not show less than a certain minimum profit—say, for example, 15 per cent. on the net cost to the Company of the goods delivered at their offices. The Company would reserve to themselves the right to do any fitting work, either through their own fitters or through contractors, on any terms they might from time to time see fit.

Sale of Gas Cooking and Heating Stoves.—These, if sold by the Company, to be at a price not less than 15 per cent. in excess of the net cost to the Company delivered at their offices.

Hire-Purchase.—It would be understood that in the event of the Company selling any cookers, fires, or fittings by way of hire-purchase, there should be added to the minimum selling prices, as defined above, a sum representing interest on the deferred payments.

Arrangements as to Fixing.—If any cooker or fire be sold by a contracting tradesman for use in the Company's district, the Company, if the customer and the tradesman so desire, are to undertake its fixing in the same manner as if it had been purchased from them, and, if the work of fixing be done by other than their own fitters, are to agree that the order to fix should be given to the tradesman who effected the sale—the tradesman thus, in any case, getting his profit on the sale, and, if the fixing be not done by the Company, a certain profit on that also. The price to be paid by the Company would be defined by schedule on the general lines of the agreements now existing between the Company and the local gasfitters doing fitting work for them under contract.

Note.—The Company's terms for free fixing of cookers or fires purchased from them are that any cooker costing not less than 27s. is fixed and connected free, provided that the position selected for the same is approved by the Company's inspector. Fires at a selling price of 15s. and upwards are similarly fixed, save that for each foot of pipe required above 15 feet 5d. is payable by the consumer.

Supply on Hire or other Terms.—It would be distinctly understood that the Company would, by the arrangement proposed, be not in any way debarred from supplying any apparatus on any terms of hire, free loan, or otherwise, they might from time to time decide upon.

Commission.—If any contracting tradesman be instrumental in letting by the Company on hire, or in the disposal on hire-purchase terms, of any gas fire, cooker, or other fitting (*e.g.*, outside lamps), a sum is to be paid to him by way of commission equal to the first quarter's rental, or to the first hire-purchase instalment as the case may be; and if the work of fixing be done at the Company's expense, but not by their own workmen, the order for this is to be given to the tradesman in question on terms as above explained. The kinds to be let on hire or hire-purchase would be defined from time to time by the Company. It must be clearly understood, however, that no commission would be paid in connection with the supply of any stove or fitting intended to displace a stove or fitting already hired from the Company, or supplied by them on hire-purchase terms. In the event of a customer being introduced by a tradesman, and, as the result of the Company lending apparatus for trial, a sale or hire be effected, the transaction is to be the subject of a commission to the tradesman.

Purchase of Goods.—Any contracting tradesman is to be entitled to purchase through the Company, for cash, gas appliances (of whatever kind) intended to be sold by him for use in the Company's district; the price charged by the Company to be not higher than will show a profit of 2½ per cent. after all cost of carriage or packing is covered. These purchases are to be made either from the Company's stock, or, if not in stock and desired by the tradesman, the goods required are to be purchased specially by the Company for him. If the goods be supplied without advance payment, the Company would be entitled to require a deposit to be kept with them of such an amount as might prove to be necessary from time to time to cover the running transactions. The contracting tradesman is to be at liberty, and to be specially invited, to use the Company's show-rooms for the purpose of selling therefrom, to consumers in the Company's district, any gas appliances he may be able to dispose of. For this purpose the price lists in the possession of the Company, and information that the Company's representatives may be able to give, are to be freely at the disposal of the tradesman thus bringing customers in; it being understood that if, as the immediate result of a tradesman thus bringing a customer in and showing him goods in the Company's show-rooms, a sale be made by the Company, it should be either passed through the tradesman's books, or the profit upon it (subject to the 2½ per cent. reserved as aforesaid) paid over to the tradesman.

Advertising on Tradesmen's Premises.—The contracting tradesman is to undertake to devote a portion of his shop window, or of a conspicuous part of his premises, to the display of advertising material to be provided by the Company. The arrangements as to room devoted to display, and method of display, are to be to the satisfaction of the Company; and subject thereto a payment is to be made to the contractor in

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 491.

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
530,000	10	Apl. 13	10½	Alliance & Dublin 10 p.c.	21½—22½	..	4 13 4
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 12	6½	Bombay, Ltd.. . . .	6½—7	..	4 12 10
140,000	5	,,	6½	Do. New, £4 paid	5—5½	..	4 14 6
50,000	10	Mch. 15	14	Bourne-mouth Gas & Water 10 p.c. . . B 7 p.c. . Pref. 6 p.c.	29½—30½	..	4 11 10
251,810	10	,,	7		16½—17½	..	4 0 0
53,200	10	,,	6		15½—16½	..	3 12 9
380,000	Stk.	Aug. 16	12½	Brentford Consolidated	245—250*	+1¼	5 0 0
300,000	,,	,,	9⅜	Do. New . . .	185—190*	−⅜	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130*	+½	3 16 11
206,250	,,	June 15	4	Do. 4 p.c. Deb. .	103—106	..	3 15 6
220,000	Stk.	Mch. 15	11	Brighton & Hove Orig.	225—230	..	4 15 8
246,320	,,	,,	8	Do. A. Ord. Stk. .	165—170	..	4 14 2
460,000	20	Mch. 30	10	British	41½—42½	+½	4 14 1
100,000	Stk.	Aug. 16	6	Bromley, Ord. 5 p.c. .	117—122*	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c. .	88—92*	..	4 17 10
500,000	10	May 12	7	Buenos Ayres (New) Ltd.	11¾—12¼	..	5 14 3
250,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
150,000	20	July 13	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	May 31	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Apl. 28	4½	Do. 4½ p.c Pref.. .	10—10½	..	4 5 9
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	101—103	+1	4 7 5
1,400,000	Stk.	Feb. 24	5⅛	Commercial 4 p.c Stk. .	117—120	..	4 6 8
560,000	,,	,,	5	Do. 3½ p.c. do. .	112—115	..	4 6 11
450,000	,,	June 15	3	Do. 3 p.c. Deb. Stk.	86—88	+1	3 8 2
800,000	Stk.	,,	6	Continental Union, Ltd.	108—113	+1	5 6 2
200,000	,,	,,	7	Do. 7 p c Pref.	137—142	..	4 18 7
424,070	Stk.	—	5½	Derby Con. Stk. . . .	124—126	..	4 7 4
55,000	,,	June 3	4	Do. Deb. Stk. . .	108—110	..	3 12 9
486,000	10	July 28	11	European, Ltd. . . .	21½—22½	..	4 17 9
354,060	10	,,	11	Do. £7 10s. paid	14½—15½	..	5 6 5
15,223,235	Stk.	Aug. 16	4⅛	Gas-light & Coke Con. Deb.	4 p.c. Ord. . . 99—100*	..	4 8 0
2,600,000	,,	,,	3½		3½ p.c. max. . . 90—92*	+⅜	3 16 1
3,799,735	,,	,,	4		4 p.c. Con. Pref. 109—111*	+1	3 12 1
4,193 975	,,	June 15	3		3 p.c. Con. Deb. 87—89	..	3 7 5
258,740	Stk.	Mch. 15	5	Hastings & St. L. 3½ p.c.		100—103	.. 4 17 1
70,000	10	Apl. 28	11	Hongkong & China, Ltd.		18—19	.. 5 15 9
3,800,000	Stk.	May 12	10	Imperial Continental .		211—214	.. 4 13 6
473,600	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.		94—96*	.. 3 12 11
175,242	Stk.	Mch. 15	6	Lea Bridge Ord. 5 p.c. .		120—125	.. 4 16 0
561,000	Stk.	Aug. 16	10	Liverpool United A . .		222—224*	.. 4 9 3
718,100	,,	,,	7	Do. do. B . .		166—167*	+1½ 4 3 10

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
306,083	Stk.	June 29	4	L'rpool Unit'd Deb. Stk.	111—113	..	3 10 10
75,000	5	,,	5	Malta & Medn., Ltd. .	4—4½	..	5 11 1
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb..	102—104	..	4 16 2
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	May 31	3½	Monte Video, Ltd. . .	11—12	..	5 16 8
1,565,892	Stk.	July 29	4⅝	Newc'tle & G'tesh'd Con.	106—107	−½	4 6 5
406,625	Stk.	June 29	3½	Do. 3½ p.c. Deb.	95—97	+2	3 12 2
15,000	10	Feb. 24	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 12	8	Oriental, Ltd. . . .	145—148	..	5 8 1
600,000	5	Mch. 30	7	Ottoman, Ltd. . .	6—6½	..	5 12 0
168,255	Stk.	—	6½	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	6	Primitiva Ord. . . .	6—6½	+⅛	4 12 4
796,980	5	July 28	5	Do. 5 p.c. Pref. .	5⅛—5⅜	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
851,070	10	Apl. 28	7	River Plate Ord. . . .	12½—13	..	5 7 8
300,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
250,000	10	Apl. 13	7	San Paulo, Ltd. . . .	12⅞—13¼	..	5 5 8
70,000	50	July 1	5	Do. 5 p.c. Deb. .	51—53	..	4 14 4
135,000	Stk.	Mar. 15	10	Sheffield A	238—240	+1	4 3 4
209,984	,,	,,	10	Do. B	238—240	+1	4 3 4
523,498	,,	,,	10	Do. C	238—240	+1	4 3 4
126,106	Stk.	Mch. 30	5¼†	Shrewsbury Ord. 5 p.c.	107—110	..	4 15 5
70,000	10	May 31	10	South African	16—17	..	5 17 8
6,250,000	Stk.	Aug. 16	5½	South Met., 4 p.c. Ord.	129—131*	+¾	4 4 0
1,895,445	,,	July 13	3	Do. 3 p.c. Deb.	88—90	−1	3 6 8
575,000	Stk.	Aug. 16	5½	S'th Suburb'n Ord. 5 p.c.	120—123*	+¾	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—127*	−½	3 18 9
112,533	,,	July 13	5	Do. 5 p.c. Deb. Stk.	130—135	..	3 14 1
502,310	Stk.	May 12	5	Southampton Ord. . .	109—112	..	4 9 3
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Feb. 24	6¼	Tottenham and Edmonton A 5 p.c. . B 3½ p.c. . 4 p.c. Deb.	125—128	..	4 17 8
563,020	,,	,,	4¼		98—101	..	4 14 1
125,000	,,	June 29	4		105—108	..	3 14 1
182,380	10	June 15	8	Tuscan, Ltd.	9½—10	..	8 0 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
30,000	Stk.	Aug. 16	7⅜	Wands-worth and Clapham A 5 p.c. . B 3½ p.c. . C 3½ p.c. . 3 p.c. Deb. Stk.	—	..	—
255,636	,,	,,	6¼		134—138*	..	4 10 7
60,000	,,	,,	5⅛		111—113*	..	4 16 0
57,564	,,	June 29	3	Putney 3 p.c. Deb. Stk.	80—85	..	3 10 7
745,872	,,	Aug. 16	5	West Ham 5 p.c. Ord. .	100—102*	+½	4 18 0
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	121—124	+½	4 0 8
193,300	,,	June 29	4	Do. 4 p.c. Deb. Stk.	104—109	..	3 13 5

† Next dividend will be at this rate.

Prices marked * are "Ex div."

respect of the gas used in the joint interest of the Company and the tradesman by way of display of the use of gas appliances. This payment is to be at the rate of 8d. per 1000 cubic feet, so long as the Company's price of gas in Croydon is 2s. 8d. The decision as to the quantity of gas on which the allowance is to be made is to rest in each individual case with the Company's General Manager.

The arrangements outlined above would be embodied in an agreement with each contracting tradesman. The Company would reserve the right to terminate any such agreement at any time, and to make special arrangements in individual cases as they might see fit.

Note.—The suggestion that tradesmen should be allowed, in case of need, to clear the Company's service-pipes, was not adopted by the Directors.

THE RECENT GAS AGITATION IN PHILADELPHIA.

The Municipal "Machine" at Work.

In the last volume of the "JOURNAL," we recorded the circumstances under which the Municipal Council of Philadelphia were frustrated by the Mayor (Mr. Weaver) in their attempt to carry out a "deal" with the United Gas Improvement Company for a renewal for a long term of their lease of the gas-works, on payment of $25,000,000 in cash. The action of the Council was brought about mainly by the influence of what is called the municipal "machine;" and its power—now broken by the action of the Mayor—has just been well described by Mr. A. Maurice Low, the Washington Correspondent of the "Morning Post." It may not be without interest to reproduce some extracts from his article, which appeared in a recent issue, as presenting some phases of municipal life in the States with which, happily, we on this side the Atlantic are unacquainted.

"Contented and corrupt" was the summing up of Lincoln Steffens, the great investigator of corruption in American cities, of the character of Philadelphia, next to New York and Chicago the most important city in the United States—a city of great wealth, of great importance, whose families pride themselves upon their birth, and which boasts a more purely native population than any other city in the country. The "good" people of New York salve their consciences by saying that their misrule is due to the foreign population—that if it were not for the hordes of ignorant and debased foreigners, swept up from the purlieus of Europe, who constantly recruit the ranks of Tammany, it would be easy enough to break its power, and New York might hope to be decently governed. You hear the same easy-going explanation from Chicago. Some other excuse must be found in Philadelphia, where, unlike New York and Chicago, the Republicans are always in control. The Republican "machine" in Philadelphia has been noted for years as being the most highly organized and the most utterly corrupt of any machine in the country. A city of more than 1¼ million of inhabitants, where the general level of intelligence is extremely high, and even unskilled labour is well paid, must have at least some moral, law-abiding, and self respecting inhabitants. Philadelphia has many. It knew that it was in the hands of a freebooting gang of dishonest politicians, who robbed the city for their personal profit; yet the respectable citizens did nothing. They knew they were responsible for the corruption, and they were indifferent. Hence Mr. Steffens, after patient investigation, reported that while other cities were corrupt, and the corruption excited profound disgust among the "better element," in Philadelphia that element was content to be corrupt.

It has always been noticed in America that, while the people are patient and long-suffering, there comes a time when they cease to be patient, and take means to put an end to their sufferings. The revolts of the people against their "bosses" are frequent; but, as a rule, a revolt spends itself after the first burst of energy. When a Mayor, or a Board of Aldermen, or a "machine" becomes so lost to all shame that even the beneficiaries of corruption begin to fear for the results, the people rise and bring their rulers to the block. Sometimes they are content with merely smashing the machine and putting a new set of men in the municipal offices; at other times vengeance will only be satisfied when the ringleaders are sent to prison. But after that is done, the reformers are usually too busy about their private affairs to continue the crusade. In a few years a new machine has been built, and the honest taxpayer has simply exchanged one set of masters for another. Philadelphia has recently risen in its might, and made a beginning of cleaning the Augean stable of municipal corruption. Its Mayor, Mr. Weaver, is the modern Hercules; and it is the irony of all ironies that he should have been selected as the agent of fate to bring destruction to the machine. He was nominated and elected by the machine—the very machine he is breaking into small pieces. Unless the machine had agreed to his nomination and election, it would have been impossible. He was selected because the machine had confidence in him, and everything might have gone as smoothly as even the most exacting of machine bosses desired had not the leaders, grown arrogant in their power, simply hoisted the black flag of piracy, and defied everything and everybody. Then it was that Mayor Weaver, though a good machine man, led the revolt.

Having given particulars of the proposed renewal of the lease to the Gas Company, the writer proceeds: The scheme was so barefaced—it was so palpably a flagitious steal—that Mayor Weaver, aroused to the enormity of the wrong sought to be perpetrated upon the taxpayers, vetoed the Council's ordinance. Whereupon the leaders of the machine calmly announced that the Mayor's action did not worry them in the least. Having absolutely in their control a majority of the members of the Council, they proposed to pass the ordinance over the Mayor's veto. The people, if they did not like it, might protest; but protest would avail them nothing. So frequently had the people protested, and so harmless were their protestations, that the machine could well afford to disregard them. But Philadelphia suddenly awoke, and there was witnessed such an uprising as has never before been seen in an American

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	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND IN ADDITION, 8,150,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

city. In the smaller cities of the West, where Judge Lynch is the most respected member of the Bench, when the people are worked up to a frenzy, they usually take a short cut to reform, and the way generally leads to a lamp-post. They came near to doing the same thing in Philadelphia; and even the most law-abiding citizens did not hesitate to say that lamp-posts were plentiful in Philadelphia, and rope was very cheap. When the ordinance was passed by the Council, an infuriated and indignant body of men and women—not hooligans or "ignorant foreigners," but substantial business men and women prominent in their churches—went to the Council Chamber to use their influence with individual members to induce them to postpone action on the question of the lease. They laughed at it. There were a few honest members of the Council, and they raised their voices in protest; and they, equally with the public, were laughed at. The people in the galleries hissed and derided the members on the floor below, many of whom were cowering in their seats, and shrank from the storm they had raised. Some of them feared bodily violence, and, the control of the police being in the hands of the machine, policemen and detectives swarmed in the chamber, ready to protect the men who were obeying the party lash. Neither entreaty nor threat had any effect. The word had gone out from the bosses that the ordinance was to be passed, and the men who had been elected by corrupt influence, who were simply put in office as tools of the corrupt gang, did their bidding. They had no choice.

It was then that the public rallied to the support of the Mayor. The churches were throw open in midday, and prayers were said invoking strength and support for the Mayor. A delegation of ministers, representing all denominations, called upon him, and urged him to remain steadfast in protecting the rights of the people. Great meetings were held, at which prominent speakers denounced the Council, and pledged themselves to stand by the Mayor in his fight for honesty. The papers were on the side of the public. But even more extraordinary was the pressure brought to bear upon councilmen by individuals. Many of the councilmen are shopkeepers in a small way of business, who find it profitable to be in politics. These were threatened with boycott, with the loss of their trade, with social ostracism. All these things told. The weak-kneed among them began to waver; and some of them, catching the drift of public opinion, renounced their allegiance to the ring, and proclaimed their intention to stand by the Mayor. But the machine was still defiant. It had such an overwhelming majority in the Council that a few desertions were of no consequence. They had argued with the Mayor, and he had proved obdurate. They threatened him with political annihilation; and finally appreciating that he could not be moved, they challenged him to do his worst. And the Mayor on his side knew that it was to be a fight, with no quarter asked or given. There was an interval between the vetoing of the ordinance and the action to be taken by the Council. Mr. Weaver employed it in removing the Chief of Police and the Chief of the Fire Department—both machine men—and installing his own men in their places. This was a blow struck at the very heart of the enemy, because the police exercise enormous political power. The machine went before one of their own Judges and obtained an injunction preventing the Mayor from removing the two officials; but the Mayor got another Judge to dissolve the injunction, and before the machine could make a new legal move he had his two appointees escorted to their offices by a squad of policemen, who were given orders forcibly to remove the old officials if they did not surrender voluntarily. These considered discretion the better part of valour, and retired in good order.

The ramifications of the machine and the extent to which the "best people" are involved in dishonest politics were made manifest when the Mayor endeavoured to employ Counsel to prevent by legal means the execution of the lease by the Council. Application was made to the leading lawyers in Philadelphia to represent the Mayor; but they declined, because their political or financial interests were bound up with those of the machine. At last the Mayor was forced to go to New York and retain as his Counsel Mr. Root, the former Secretary of War. Within a day or two of the time when the Council were to act upon the Mayor's veto, the machine sullenly and suddenly yielded. The Gas Company announced that, in view of the objections of the public to the proposed extension of the lease, they would decline to accept it; and the machine leader announced that no further legal attempt would be made to secure the restoration of the officials deposed by the Mayor. The public are in doubt whether the machine is frightened or is merely waiting for a more propitious time to rob the city. More likely the latter, is the general opinion.

This uprising of the people against the bosses has had two curious effects. In the first place, it has given an immense impetus to municipal ownership; in the second, to a fierce determination to drive the money-changers out of the temple—to make the City Council chamber a place for the transaction of municipal legislation that can stand the scrutiny of day, and not a mart where franchises are trafficked in for the profit of councilmen and their bosses at the expense of the citizens. Philadelphia has been given the opportunity to prove whether it is satisfied to be "corrupt and contented" or willing to be honest. It is the same problem as that presented to most American cities; and most American cities seem to be as satisfied to take things as they are just so long as things stop on the verge of desperate badness.

Fire at the Minehead Gas-Works.—During a violent thunderstorm which raged in the early hours of Thursday morning, a fire occurred at the Minehead Gas-Works. The Manager (Mr. E. Chalmers) was immediately called, when he observed the roof of the purifier-house in a blaze. The staff at once endeavoured to isolate the fire, and after a good deal of hard work were successful in their attempt. The damage, which was confined mainly to the roof of the building, is estimated to be less than £100, and is covered by insurance. No other cause for the outbreak can be assigned than that the building was struck by lightning.

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THE NEW RESERVOIR AT TORQUAY.

A Largely Exceeded Estimate.

An inquiry was held at Torquay on Tuesday last, by Mr. A. A. G. Malet, M. Inst. C.E., an Inspector of the Local Government Board, respecting an application by the Town Council for power to borrow an additional sum of £17,500 for the completion of the new reservoir which is being constructed under the authority of the Act obtained by the Corporation in 1903. The Town Clerk (Mr. F. S. Hex) explained that under the Act the Corporation were empowered to expend £22,000. A great deal of difficulty had been experienced in getting a sure foundation for the dam; and the consequence was that the amount authorized to be expended had already been exceeded. A report prepared by the Water Engineer (Mr. S. C. Chapman) showed that an additional sum of £13,562 would be required to complete the work; and, with contingencies, this had been raised to £14,221. Additional works in the construction of a draw-off and a screening-dam were required; and there was an addition of £1804 for extra land. Originally, it was intended by the Corporation to acquire 7½ acres; but, having regard to certain mining rights, it was deemed prudent to purchase 7 acres in addition, and this would effectually prevent interference with any portion of the reservoir work. The Corporation asked that the additional loan should be for 55 years—the period for which the original loan of £22,000 was sanctioned. Evidence having been given by Mr. Chapman, as well as by Mr. Strachan, the Consulting Engineer, as to the nature of the work and the difficulties encountered, the Inspector said that, even making allowance for the bad soil, the estimate for the work seemed to have been distinctly faulty. He did not see what reason the Town Council could really give for the Local Government Board allowing, under these circumstances, the same period for repayment as in the case of the original loan. The Town Clerk replied that a great many of the difficulties could not be foreseen. It was one and the same work; and he submitted that if the estimate had been more correct, and a larger sum asked for in the first place, Parliament would probably have given the Corporation 55 years for repayment. The Inspector said the Town Clerk's argument would have been perfectly good if it could be shown that the Corporation had sent in a reasonably sound estimate to begin with; but there were too many cases in which estimates were whittled down by local bodies simply to get schemes through—the estimates being submitted with the knowledge that they would be exceeded. Mr. Strachan said that when the original estimates first came before him in the course of the parliamentary proceedings, he called attention to the hopeful view taken on many matters. Still there were certain items which could not have been foreseen; and the expenditure upon these was, in round figures, £10,000. The purchase of the additional land was almost absolutely necessary. The Town Clerk said the Corporation hoped that the Local Government Board would look at the question of repayment in the broadest possible way. Mr. Luxmoore, a member of the Town Council, said the reservoir was not necessary; and though he did not oppose the granting of a loan to finish the work (it must be completed now that it was begun), he believed it was a fact that the town would not be provided with any more water. The mains could hardly supply the borough at present; and another main would have to be laid before the residents got any benefit from the new reservoir. The water charges had already been raised; and some of them bore very hardly on small consumers.

BOSTON (MASS.) WATER SUPPLY.

The great Wachusett reservoir in Central Massachusetts, on the south branch of the Nashua, is all but completed; and a discussion has commenced as to the next step to be taken in furnishing the Metropolitan district, comprising Boston and other cities and towns within a radius of 20 miles, with a supply of water which will always meet the demand for domestic and commercial purposes. The engineers concerned in working out a great and comprehensive plan of water supply, completed ten years since, made surveys for a series of great reservoirs, of which the Wachusett was the first. The next in the chain was the Ware, and beyond that the Swift. The Ware plan would store some 11,000 million gallons, which would be no very great addition to the 63,000 million gallons of the Wachusett reservoir, everything considered. But the Swift reservoir would store 406,000 million gallons—a total compared to which every other artificial body of water in the world seems small. The Wachusett reservoir is the largest, with the possible exception of one in India, concerning which the Massachusetts authorities have no adequate information. Some idea of what the Swift reservoir will be may be obtained from the fact that, once filled, it will provide the million and more people of the Metropolitan district with water, on the present basis of consumption, for about ten years, even if not a drop entered the basin during all that period. It would cover nearly 37 square miles, and would drain a watershed of 185 square miles. The Wachusett reservoir has an area of 6½ square miles. The average depth of water over all the 37 square miles would be 53 feet. The water would pass on its way to Eastern Massachusetts through the Wachusett reservoir, and a tunnel 27⅝ miles long would have to be built to make the connection; the difference in level of the two lakes being 135 feet. This is the plan which will be recommended to the Massachusetts Legislature. The Wachusett reservoir, with its conduit, some miles of it a tunnel, has taken nearly ten years to build. Besides a dam, 1250 feet long and 158 feet above rock, long dykes had to be constructed. The Swift region is sparsely populated, having only about 30 inhabitants per square mile; so that the element of damages will be much less than in the Nashua Valley. The Metropolitan district consumed 113 million gallons of water per average day in 1904. The total daily capacity of its water supply at present, with the Wachusett reservoir, is 173 million gallons during a series of dry years.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Perth Town Council, at their monthly meeting on Monday of this week, took up the consideration of the recommendation of the Gas Committee that the salary of Mr. W. B. M'Lusky, the Manager, should be increased by £50 a year. Mr. Cuthbert, in moving the recommendation, said they were all agreed that in Mr. M'Lusky they had a first-class servant, and an able Manager. After submitting statistics with reference to other towns, he said he thought that in increasing Mr. M'Lusky's salary to £400 they were not going out of the way. Mr. Hamilton, in seconding, said that Mr. M'Lusky was a good man. He was giving them good and cheap gas, and he had reduced the expenditure in every way. The proposal was agreed to unanimously.

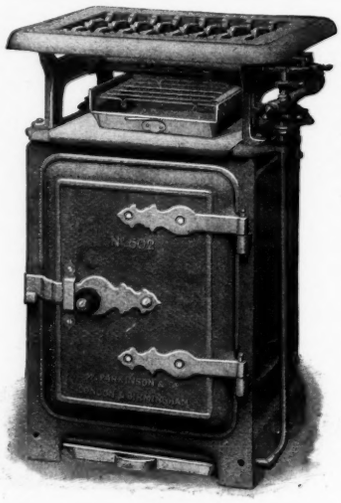
The Peterhead Town Council, at their meeting on Monday, had before them the accounts for the past year. Bailie Ritchie, who submitted them, said they indicated another year's successful work, and the results fully came up to the forecast of the Manager—Mr. J. Keillor—a year ago. This success had been attained notwithstanding a heavy fall in the prices received for residuals, and a considerably less return on coke. The quantity of gas sold was 31,151,000 cubic feet—an increase of 2,480,000 cubic feet upon the previous year. The revenue from the sale of gas was £5541—an increase of £227, which, considering that there had been a reduction of 2d. per 1000 cubic feet, showed a very satisfactory increase of business. From residuals they had a revenue of £1136, which was a reduction of £144. The total revenue was £6944—an increase of £83. On the expenditure side, they had paid for 3602 tons of coal, £2892—a reduction of £120. While they used 110 tons of coal more, they had produced 2½ million cubic feet of gas more; this being one of the results of the working of their new condensing and scrubbing plant, which had increased the make by 450 cubic feet per ton of coal. Purifying materials had cost them only £35, as against £186. Maintenance of works and plant, and minor improvements, paid out of revenue, amounted to £520, which was £199 more than in the previous year. The total expenditure was £5084, which, deducted from the revenue, left an actual gross profit of £1860. This, carried to a balance of £2420 standing at the credit of the net revenue account, made a total of £4280. Out of this there had to be provided: To write down the capital account, £1511; interest, £715; sinking fund, £735; and bad debts, £25—a total of £2990. This left a balance of £1310, as compared with £909 last year, showing a net profit on the year's intromissions of £411, which, he hoped they would agree, was a very satisfactory return, and very creditable to the Manager, and to those under him. As to the disposal of the surplus, while it was amply sufficient to allow of a further reduction of 2d. per 1000 cubic feet, the Gas Committee thought it would be wiser policy to allow the price to remain at its present fairly low figure—3s. 6d. per 1000 cubic feet. The most striking feature of the year's operations was the great increase that had taken place in the number of prepayment meter consumers. These now amounted to 607; and in connection with 477 of these there were cooking appliances. The consumption of gas through these 607 meters was 4,225,000 cubic feet, giving a revenue of £851. During the year they had spent, on capital account, £622 upon new plant, £727 on prepayment meters, and £469 on gas-stoves. The Manager estimated that the present year should show a favourable balance—at least, not less than last year's—based on a lower price paid for coal, and a steady increase in the consumption of gas. Provost Leash said it was pleasant to hear such a report from the Convener. It was only right, also, that they should take notice of the splendid work that was being done by their Manager. The accounts were adopted.

At the monthly meeting of the Greenock Town Council on Tuesday, Bailie M'Onie, in moving adoption of the minutes of the Gas Committee, referred to letters which had been received from firms in the town asking that the price of gas used for power purposes should be at a lower rate than that used for lighting. The matter had been referred to a Sub-Committee, who would look into it fully. At the same time, the speaker hoped the members of the Council would carefully consider the matter before next meeting. In byegone times a lower rate was charged for gas used for power purposes, and they were now asked to revert to that practice. The minutes were adopted.

The Town Council of Galashiels on Monday considered the subject of the leakage from the town reservoir. Some time ago, Messrs. Leslie and Reid, of Edinburgh, submitted five alternative proposals for dealing with the situation. One of these was the construction of a new puddle wall outside the existing embankment, and another was the construction of a new reservoir elsewhere. The Water Committee, having in view that the leakage had materially diminished of late, and that the available supply of water was ample for present needs, recommended that further consideration of the whole subject be deferred in the meantime. Mr. MacPhail said it would take between £10,000 and £12,000 to make the present reservoir water-tight, and this would go a long way towards building a new reservoir. Provost Rutherford was opposed to the shelving of the question. Recent operations had showed the embankment to be in as unsatisfactory a state as it could well be, and the town might at any moment be placed in the position of having to take water direct from the Caddon Water, without its passing through the reservoir. He moved that it be remitted to the Engineer to ascertain where a suitable reservoir could be made, and what the probable cost would be. The Provost's motion was carried by eight votes to six.

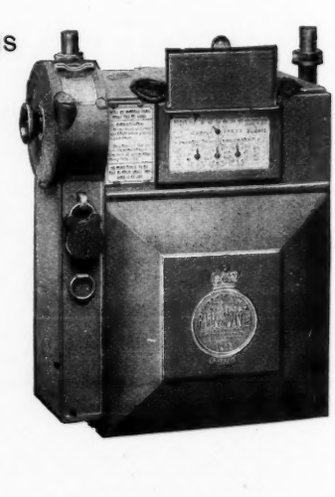
I have hesitated to give currency to a rumour which reached me some time ago, to the effect that on water having been impounded in the new Talla reservoir of the Edinburgh and District Water Trust, a serious state of matters had been discovered, in an abnormal growth of weeds. But yesterday a letter signed "Veritas" was published in the "Scotsman," which makes the matter public. The writer says he visited the reservoir the other day and found that the water was "about as black as tar," and that futile attempts were being made to

PARKINSON'S



SLOT INSTALLATIONS

FOR QUOTATIONS



WRITE—

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BELL BARN ROAD, BIRMINGHAM.

remove moss from the bottom of the reservoir. He opines that "many thousands of pounds will have to be spent, with doubtful results, before the water can be made at all fit for domestic use." It will be observed that the writer did not perceive the weeds. In all the circumstances, I am disposed to look upon the outcry as premature, and to believe that the Water Trustees are only dealing with a state of matters which was fully anticipated by their Engineers, and that, after a few months, the quality of the water will be found to be up to expectation.

CURRENT SALES OF GAS PRODUCTS.

Week ending Aug. 19.

The London market during the week has been very steady; but there is not much new business to report. Pitch remains at 29s. 6d. net at works; and as makers are well sold, they evidently intend to maintain their price. Benzol, 90 per cent., is in strong demand, and 10d. net is believed to have been paid; while 50's toluol, and solvent naphtha are also much inquired for. Creosote oil of good quality is scarce at 1¾d. to 1⅞d. net. Carbolic acid, 60's, at about 1s. 9d. is unduly cheap as compared with the value of crystals. Sulphate of ammonia is in an improving position. A large business has been done in the neighbourhood of £12 10s. on Beckton terms; and the tendency is still upward—the quantity available being small.

Sulphate of Ammonia. LIVERPOOL, *Aug.* 19.

The improved demand which commenced last week has been sustained, and there has been a slight improvement in values; the closing prices being £12 3s. 9d. per ton f.o.b. Hull, and £12 7s. 6d. to £12 8s. 9d. per ton f.o.b. Liverpool and Leith. Direct demand has been moderate; but the bulk of the buying has been for covering sales made for August delivery. Attention has again been directed to the forward position; but for October-March and January-June delivery, makers have advanced their price to £12 12s. 6d. per ton f.o.b. Leith, and so far buyers do not seem inclined to follow. £12 8s. 9d. per ton has been accepted for delivery up to the end of the year at other ports.

Nitrate of Soda.

Owing to reduced supplies, this article is firm on spot at 10s. 3d. to 10s. 9d. per cwt., according to quality; and 10s. 1½d. per cwt. is now quoted for spring delivery.

Tar Products. LONDON, *Aug.* 19.

Markets have been generally quiet during the past week; but prices have been fairly well maintained, with the exception of carbolic acid, which is decidedly easier. The German consumers now report having purchased 60's at 1s. 7½d. and 1s. 7⅞d. for August-October delivery, but an offer of 1s. 8d. was declined by London makers for September-December. As a rule, producers will not accept less than 1s. 9d. for either prompt or forward delivery; but just at present consumers do not appear at all anxious to meet the market. Crystals are still in fairly good demand; but it is quite evident that the German manufacturers are accepting the parity of 6½d. for 39-40 per cent. for August delivery. There is really nothing of importance doing in anthracene. Several small parcels have recently been placed at 1½d. per unit for 38-40 per cent.; but so far as forward delivery is concerned, there is no business whatever. Benzol is certainly fairly steady; and there appears to be a very good demand, especially for prompt delivery. So far as London is concerned, there is practically nothing offering for prompt, and makers ask 10d. for September delivery; but business is reported in the North at 9½d. for August-October. In 50-90 per cent., there is not, however, any business to advise. There is very little offering, and makers do not seem at all anxious to sell for forward delivery. The demand for toluol continues very strong; but makers are fully sold for prompt and do not care to offer forward—believing in still higher values. In creosote, the principal London producers are not offering anything at under 1¾d.; but the smaller makers would certainly accept less than this for salty oil. In Yorkshire, there is still business doing at 1⅞d. for prompt, although in some instances 1½d. has been accepted; while so far as Lancashire is concerned, the market is decidedly quiet. There is really nothing doing in pitch. South Wales consumers are still buyers for delivery all over next year; but on the Continent matters are very quiet, and consumers do not appear at all anxious to purchase—being fairly well supplied for early delivery.

The average values during the week were: Tar, 16s. to 21s. Pitch, London, 28s. 6d. to 29s.; east coast, 28s. to 28s. 6d.; west coast, 25s. 6d. to 26s. Benzol, 90 per cent., 9½d. to 9⅝d.; 50-90 per cent., 9d. to 9¼d. Toluol, 8½d. to 9d. Crude naphtha, 3½d. to 3⅝d.; solvent naphtha, 8½d. to 9d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1 9/16d. to 1 11/16d.; North, 1½d. to 1⅝d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 1s. 8d. to 1s. 8½d. Refined naphthalene, £4 10s. to £8; salts, 12s. 6d. to 14s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been rather active during the past week, and closed with a decidedly firmer tone. Beckton are reported to have sold considerable quantities, and are now entirely out of the market. The South Metropolitan Company report business at £12 11s. 3d. on their own terms, and state that they decline to sell any further quantity at this price. In Hull, business was done early in the week at £12 3s. 9d.; but the market certainly closes with a firmer tone, and sellers now ask £12 5s. in any position. It is difficult to fix the exact value at Leith. Sales were certainly made early in the week at £12 6s. 3d., but makers report business later on at £12 7s. 6d., and as a rule decline to offer for forward delivery. The market in Liverpool closes with a fairly good demand at £12 6s. 3d. to £12 7s. 6d.; but there is really very little offering.

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COAL TRADE REPORTS.

Lancashire Coal Trade.

Business in all kinds of engine and steam coal continues satisfactory. Slack is comparatively dear in the higher qualities on account of its scarceness. There is, and has been for some time past, competition from Yorkshire and the Midland counties coalfields, but not to any large extent. Lancashire coal owners do not fear such inroads—relying on the quality of their products and the differences of carriage in their favour. When the new pit at Himley, Staffordshire, comes into operation, some developments may be looked for, as experts estimate that the district is rich in coal of rare value, and that there is promise of a hundred years of work. The demand for coal for shipping is improving *pari passu* with the gradual expansion of the Ship Canal trade; and this has led to improvements and enlargements of tips at coaling stations. The threatened general strike in the cotton trade having been averted, the outlook in the coal trade becomes much more favourable. Last week's quotations are unchanged.

Northern Coal Trade.

There is a steady demand for coals; but it is one that is well met at present. The export demand is fairly good, and is both for steam and other kinds of coal, and seems to include a larger proportion of smithy coals and of smalls—possibly owing to the incidence of the coal tax. Best Northumbrian steams are steady at 9s. 6d. per ton f.o.b., second-class steams are 8s. 6d., and steam smalls are from 4s. 10½d. to 5s. 9d. In gas coals, there is now a growing demand, which will be more rapid next month when the heavier deliveries begin to the great gas companies. Prices are now based on Durham gas coals varying, according to quality, from 7s. 9d. to 8s. 3d. per ton f.o.b. There are one or two contracts for gas coals just about closing; but they are for moderate quantities, and are usually fixed at prices about 7s. 10d. to 8s. according to quality, with variation if freights have varied. Coke is generally firm; and while gas coke is in larger output, there seems to be more used at some of the gas-works, so that the price of gas coke for export is unchanged. For local use it seems easier in some towns.

Scotch Coal Trade.

There has been more activity in the market; a steady demand having set in for shipment. The home demand has not moved correspondingly. The prices quoted are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. to 9s., and splint 8s. 6d. to 8s. 9d. The shipments for the week amounted to 279,637 tons—an increase upon the previous week of 23,996 tons, and upon the corresponding week of last year of 30,735 tons. For the year to date, the total shipments have been 7,311,819 tons—an increase of 443,138 tons on last year.

Plymouth Water Supply.—Reference was made, at a meeting of the Plymouth Town Council yesterday week, to the value of the provision which had been made by the Corporation for the storage of water. Mr. A. R. Debnam, the Chairman of the Water Committee, said that for six weeks past insufficient water had been flowing into the reservoir to meet the needs of the town. They had, however, not only been able to maintain a full supply, but had been able to assist Devonport and avoid a water famine there. But for the reservoir at Burrator, both towns would have suffered from scarcity of water.

Dawlish Water Supply.—On Thursday last the members of the Dawlish Urban District Council paid their annual visit to the source of the town's water supply. Under the guidance of Mr. R. E. Clarke, the Surveyor, an inspection was made of the provisions to ensure the purity of the supply and of the storage. It was pointed out that for eight months of the year there is twice as much water running to waste at the Thorus as the town wants, but that there is only a storage sufficient for three days' full supply. Mr. J. S. Whidborne, the Clerk, said that if the Council decided to do anything to increase the storage they would be in an excellent financial position for doing so, for in the next few years several of their loans would be paid off.

Ancient Wells in Birmingham.—The "Birmingham Daily Mail" recently contained the following paragraph: "Considerable interest attaches to the discovery of an ancient well in Birmingham, says Mr. Joseph Hill, the well-known antiquarian; and yet within the memory of persons still living the whole water supply of the town was derived from wells, and Edgbaston Street, St. Martin's Lane, Digbeth, Park Street, Moor Street, and the Bull Ring, or Corn Cheaping, were all honeycombed with wells. In some parts wells existed in the cellars, while in the streets, notably around St. Martin's Church and Ladywell, pumps were set up for the free use of the public. In fact, the proper name of the church end of Digbeth was Well Street. The Cock well, which was near the Cock Tavern in this Well Street, must have been of great antiquity. Another public well, probably as ancient, was discovered when the old Lamb House at the bottom of Crooked Lane (known as Suffield's) was destroyed some dozen years ago. The great stones of this well, like those at the Old Crown House, unearthed some fifty years since, were the work of a very early date. The public well in Lamb Yard was known to our forefathers as the well at the Welsh End, and was maintained at the public expense; as also was another, probably still more ancient, near the Swan Tavern in New Street, behind the public toll-booth. This last-named well was undoubtedly the origin of the thoroughfare, which has been called New Street since the days of Richard II., when the former and very old bye-road or pathway was dignified by being made into a street, and the Guildhall was built in it. But the well remained as a public well until the end of the eighteenth century; and, curiously enough, it still remains under the footpath. It was laid bare a few years since, and again covered over. It is not surprising that many old wells have been discovered of late years; but the one in Bennett's Hill has a greater interest, on account of its age, than any found for some years. The one at the back of the Old Royal Hotel, for instance, was younger by nearly a century; for the one under notice was, there is small doubt, made in 1680, when Colmore Row was New Hall Lane, and New Hall itself was a comparatively modern mansion."

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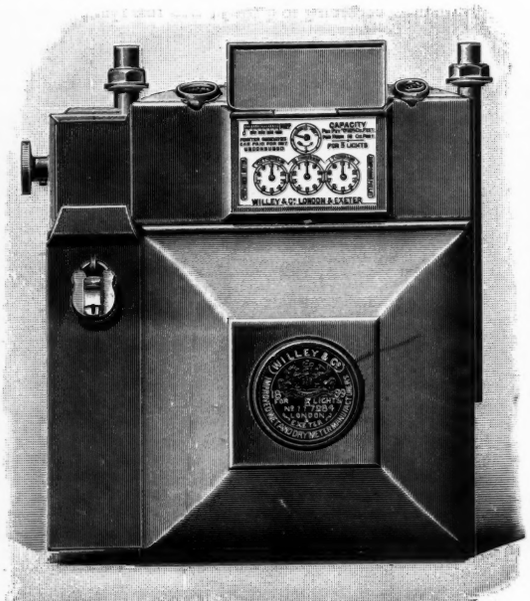

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Fire at the Frinton-on-Sea Electric Light Works.—Those of the residents at Frinton-on-Sea who depend upon the electricity works for their light suffered some inconvenience last Saturday in consequence of the complete destruction of the works by a fire which broke out, from some cause unknown, at about four o'clock in the morning.

A Burst in the Thirlmere Main.—A considerable amount of damage and inconvenience were caused at Agecroft last Thursday evening by the bursting in two places of one of the 36-inch mains taking water from Thirlmere to Manchester. The roadway for a distance of about 50 yards was destroyed; but the water was cut off for a very brief time only, as it was found possible to obtain a supply from the other two pipes. The roadway, which is the only public thoroughfare for traffic to the local collieries, was repaved about three weeks ago.

A Water-Main Burst in the Potteries.—Last Saturday week, some of the Potteries towns, and Newcastle-under-Lyme and many parts of the surrounding district were deprived of water, owing to the bursting of a trunk main from the Hatton reservoirs at Trentham. Many householders found the supply cut off on Friday night; but on Saturday the failure became general. The whole of Newcastle was all day without water; and Wolstanton, Stoke, and parts of Hanley and the neighbouring districts were similarly affected. It appears that while workmen were engaged on Friday night in repairing the trunk main at Trentham, the pipe burst again. Thirty workmen were employed; and late on Saturday night the burst was repaired sufficiently to allow of water being turned on.

Ossett Water Supply.—For some time past, the Ossett Corporation have been in negotiation with the Halifax Water Committee for a supply of water, as, on the completion of the Walshaw Dean reservoirs, Halifax expect to have at command a quantity far in excess of their own requirements. Already they have arranged to supply Morley, when the new reservoirs are in use, with a maximum of 2 million gallons per week; and now the Committee have agreed to offer Ossett from 2 to 3 million gallons per week for twenty years. The price, as in the case of Morley, has been fixed at 5d. per 1000 gallons; and in each instance the water will be delivered at Brighouse into the mains of the purchasing Corporation. Ossett are said to be agreeable to the terms; but the scheme has yet to be formally ratified by both Councils.

The Dangers of Geysers.—At Hackney, last Wednesday, Dr. Wynn Westcott held an inquiry respecting the death of Victor Ignatz Weiss, a clerk, lately residing in Cricketfield Road, Clapton. Carl Weiss, of Winterthur, Switzerland, identified the body as that of his brother, who, he said, had been in England about six weeks. He was always healthy. Madeline Godman, daughter of the landlady, stated that about ten o'clock on the morning of Sunday, the 13th inst., the deceased said he would have a cold bath. Witness partially filled the bath with cold water, and opened the window. As the deceased was longer in the bathroom than was necessary, she knocked at the door, but, failing to get any reply, thought something must be wrong. At last she entered, and then found the deceased lying in the water, apparently dead. The water was warm. Dr. George Birch, who was called, found the young man dead. He said the water had undoubtedly been heated; and for this purpose the gas had been lit in a geyser. Deceased had closed the window, and as the room was very small, the air would soon be exhausted. Deceased had probably become faint, slipped under the water, and was drowned. There was no ventilating chimney to the geyser. The Coroner remarked that this was probably the cause of all the trouble. The Jury returned a verdict of "Accidental death."

We have received from the Steel Barrel Company, Limited, of Uxbridge, a copy of their pamphlet No. 2, which has just been issued, showing the application of electric welding in the construction of steel casks, lead saturators for sulphate of ammonia plant, drums for containing strong sulphuric acid, and other vessels. They claim that, by their system of making joints, the different parts of the vessel are perfectly united, and the greatest possible strength is secured.

Messrs. Edgar Allen and Co., Limited, of Sheffield, have been entrusted with a contract for coke-handling plant for the Middlesbrough Gas-Works, in connection with their inclined retort-house. The plant consists of two hot-coke conveyors, gravity bucket conveyor, gantry, and travelling rope crane, all to the designs of Mr. David Terrace, the Corporation Gas Engineer and Manager. They have also secured a contract for the supply and erection of a further set of ash-shoots for the electricity works of the Sheffield Corporation.

Messrs. Brotherton and Co., Limited, chemical manufacturers, of Leeds, Wakefield, and other places, have acquired the controlling interest in the Wear Fuel-Works at the South Docks, Sunderland. Though the title remains unaltered, the making of patent fuel was discontinued some years ago; the present business being in chemicals. We are informed that Mr. W. Dixon (of Sunderland), who was connected with the works for 33 years, has left the firm, and commenced business on his own account as a chemical broker.

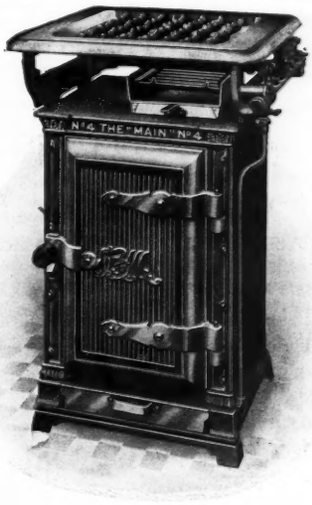
The Reading Gas Company have lately opened show-rooms in which specimens of the best modern appliances for lighting, heating, cooking, and motive power can be seen in operation. In connection therewith the Company are issuing a neatly printed leaflet setting forth the advantages of gas, and indicating how the consumers may obtain them under the best conditions; while at the show-room there is in attendance an officer ready to furnish the fullest information. It only remains for the residents to avail themselves of his services.

At the annual meeting of the Leeds Fire-Clay Company on Wednesday, the Chairman (Mr. W. D. Cliff) entered at some length into the circumstances which had brought about the loss of £30,000 on the past year's trading, as announced in the report noticed last week. He pointed out that economies had been effected during the year that would help the Company considerably when trade returned to the normal state of things. Stock profit had been made during the year; but the Directors felt it wiser to meet the present depressed state of things by a liberal writing down, even to the extent of drawing on the reserve. With a revival in trade, he saw no reason why they should not make as good profits as in the past.

The "MAIN"

Gas

Cooker



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LONDON, GLASGOW, FALKIRK, BRISTOL, MANCHESTER,

BIRMINGHAM, AND BELFAST.

A house sparrow lighted an incandescent street-lamp at Marlborough, a few days ago, by settling on the ring of the lamp, and thus pulling down the lever of the bye-pass.

The Directors of Messrs. Fletcher, Russell, and Co., Limited, have declared an interim dividend on the ordinary shares at the rate of 10 per cent. per annum for the current half year.

It will be seen by an announcement which appears elsewhere, that the Bognor Gas Company will offer for sale next Saturday 520 shares of £5 each. The new capital is required for the extension of the distributing plant, and it will rank with capital on which 8 per cent. was paid last year under the sliding-scale.

Messrs. D. Y. Stewart and Co., Limited, of Glasgow, have secured the contract for the supply of 525 tons of cast-iron pipes and castings at a cost of £3670 7s. 6d., and Messrs. J. Blakeborough and Sons, of Brighouse, Yorks, that for the supply of sluice-valves, &c., at a cost of £2225 11s., for the Staines reservoirs communication works of the Metropolitan Water Board.

The Directors of the Bristol Water Company have declared interim dividends for the half year to the 30th of June at the rates of £8 and £5 12s. per cent. per annum on the ordinary and 7 per cent. maximum consolidated stock.

At a meeting of the Gas-Strip Association in Birmingham last Thursday, it was decided to advance the price of gas strip 2s. 6d. a ton, making the minimum basis price £6 for small lots and 2s. 6d. less for large consignments, less discount, at local stations. The advance has been necessitated by the increased value of raw material. Manufacturers report brisk inquiries, and depleted stocks.

Messrs. Fenlon and Son, of Whitefriars, have recently introduced two new geysers—the "Fleet" (open chamber) and the "Tudor" auto-geyser. In the former, the water is distributed evenly over a very large surface, whereby it is heated rapidly; so that the geyser is specially suitable for baths. The latter is arranged to furnish a supply of hot water to any part of a house; a pipe being connected to the outlet, and carried to the hot-water taps.

WANTED, FOR SALE, CONTRACT, &c. ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER AND MANAGER. Todmorden Gas Company. Applications by Sept. 16.
WORKS FOREMAN. Devonport Gas Department.

Situation Wanted.

GAS FITTER. No. 4446.
HEAD CLERK (ENGINEERS). Turner, Saltley.
STORE AND TIMEKEEPER. Harvey, Grays.

Plant, &c., for Disposal.

GAS-VALVE. Baker and Co., Cardiff.

Tank Waggons on Hire.

CLAYTON ANILINE COMPANY.

Gas Exhibition, Newport (Mon.).

Applications for Space to Newport Gas Company.

Company Meetings.

HARROW AND STANMORE GAS COMPANY. Albion Tavern. Sept. 4. Twelve o'clock.

Stocks and Shares.

BOGNOR GAS COMPANY. Aug. 26.
NEW CONVEYOR COMPANY.

TENDERS FOR

Brass Cocks, &c.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.

Coal and Cannel.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.
STRATFORD GAS DEPARTMENT. Tenders by Sept. 2.

General Stores, Shovels, Oil, Gaskin, Iron and Steel, Glass, &c.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.

Lamps and Lamp Irons.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.

Lime.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.

Meters.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.

Oxide of Iron.
EDINBURGH AND LEITH GAS DEPARTMENT. Tenders by Sept. 11.

Pipes and Castings.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 31.

Reservoir (Covered).
SELBY WATER DEPARTMENT. Tenders by Sept. 6.

Sulphate of Ammonia.
PONTYPRIDD GAS DEPARTMENT. Tenders by Aug. 28.

Tar and Liquor.
OSSETT GAS DEPARTMENT. Tenders by Aug. 29.
WIDNES GAS DEPARTMENT. Tenders by Sept. 5.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.
JOHN WM. O'NEILL,
Managing Director,
PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

CORNELIUS BORST & CO.,
AMSTERDAM.
DUTCH BOG ORE
for
GAS PURIFICATION.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd.,
HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.),
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

SPENT OXIDE.

THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

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(NATURAL.)

BALE & CHURCH will be pleased to send Quotations and Samples on application.
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BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
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ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.

JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

BIGGS, WALL, & CO., 13, Cross Street,
Finsbury, E.C. *Telegrams:* "RAGOUT," LONDON.
Telephone: 273 CENTRAL.
SATURATORS—See Advt. in last week's issue.
EXHAUSTING PLANT—See Advt. in this week's issue.
SULPHATE PLANT—See Advt. in next week's issue.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

COUNTY BOROUGH OF DEVONPORT.

(GAS DEPARTMENT.)

WORKS FOREMAN.

WANTED a Reliable and Experienced Man, as GENERAL CARBONIZING and WORKS FOREMAN. Must be well acquainted with up-to-date Plant and Machinery, and used to controlling men. Wages £3 per week, with house on Works, Coals, Gas, &c.

Applications to the undersigned, stating Age, Experience, &c., with References only as to character and ability.

JOSEPH WM. BUCKLEY,
Engineer and General Manager.

Gas-Works, Devonport,
Aug. 15, 1905.

BOROUGH OF TODMORDEN.

WANTED, a Gas Engineer and Manager. Commencing Salary at the rate of £200 per annum, payable monthly.

Applications to be made on prescribed form, which will be supplied by, and must be returned to, the Town Clerk, before Sept. 16, 1905.

Canvassing, direct or indirect, will absolutely disqualify.

By order,
D. SUTCLIFFE.
Town Clerk.

STORE and Timekeeper (Age 20) seeks Employment on Gas-Works. First-class Reference and Experience.

Address T. HARVEY, Somerset House, West Thurrock, Grays, ESSEX.

HEAD Clerk desires confidential and responsible Appointment. Thoroughly Experienced with Engineers' Correspondence, Buying, Accounts, Railway Matter, Abstracts, Wages, Keen Costs of Production (Card system), Modern Methods. Excellent References.

Address, J. TURNER, 51, Bowyer Road, Saltley, BIRMINGHAM.

GAS-FITTER seeks re-engagement in Gas-Works. Well up in all branches of Gas Fittings, Meters, Fires, Cookers, Mains, and Services. Age 29. Good References.

Address, No. 4446, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.

We guarantee promptness, with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

Telegrams: SATURATORS, BOLTON. Telephone 0848.

PURIFYING Machine by Walkers. 12-inch Connections and Tar-Extractor in base. Cheap for immediate removal.

FIRTH BLAKELEY, Gas Engineer, DEWSBURY.

TO BE SOLD, Gasholder, 30,000 cubic feet capacity; another 15,000 feet capacity. Both new and ready for delivery.

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GASHOLDERS: 25 ft. by 10 ft. and Cast-Iron Tank; 30 ft. by 10 ft. and Steel Tank; 45 ft. Telescopic and Steel Tank; 40 ft. by 12 ft. and Steel Tank. All sold cheap if cleared this year.

FIRTH BLAKELEY, Gas Engineer, DEWSBURY.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

GLASS SHADES of every description, for all kinds of Interior GAS LIGHTING. Illustrated sheets on application.

JOHN WALSH WALSH,
SOHO AND VESTA GLASS WORKS, BIRMINGHAM.
Telegrams: "VESTA, BIRMINGHAM."
National Telephone: No. 63.
London Show-Room: 4, HOLBORN CIRCUS, E.C.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO, LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TAR AND LIQUOR WANTED.
Best Prices paid.
DENT AND CO.,
Ouse Chemical Works, SELBY.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

TO LET ON HIRE.

CYLINDRICAL Tank-Waggons, suit- able for the carriage of Benzol or Crude Naphtha.

Apply CLAYTON ANILINE COMPANY, LIMITED, Clayton, MANCHESTER.

FOR SALE.—One 9-in. Centre Gas Valve (makers E. Cockey and Sons), with necessary Pipes and Fittings. In First-rate Condition. Can be inspected by appointment at Lincoln.

Apply to P. BAKER AND CO., Dock Chambers, CARDIFF.

THE Gas-Works Development Syndi- cate are prepared to purchase Gas-Works for Cash. Preference given to a property where there is room for development.

Apply, by letter, with full Particulars, in confidence, addressed to the SECRETARY as above, 119, LONDON WALL, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters. Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

SELBY URBAN DISTRICT COUNCIL.

NEW WATER-WORKS. COVERED SERVICE RESERVOIR. CONTRACT NO. 4.

TENDERS are hereby invited for the construction of a Covered Service Reservoir.

Copies of the Plans, Specification, Bill of Quantities, and Form of Tender will be supplied on application to the Engineers, Mr. Percy Griffith, M.Inst.C.E., 54, Parliament Street, Westminster, S.W., and Mr. Bruce McGregor Gray, Assoc. M.Inst.C.E., Council Offices, Selby, Yorkshire, on payment of £5, which will be returned to all Contractors who shall submit a *bonâ-fide* Tender for the work on or before the 6th day of September, 1905.

Tenders must be made upon the Form provided and returned with the Plans, Specification, and Bill of Quantities, fully priced, to the undersigned by the date named above. The whole to be properly sealed and delivered to the undersigned by the date above named.

The Council do not bind themselves to accept the lowest or any Tender.

(By order of the Council),
J. H. BANTOFT,
Clerk to the Urban District Council.

Council Offices, Selby.
Dated the 25th of July, 1905.

PONTYPRIDD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive Tenders for the disposal of their Surplus COKE and SULPHATE AMMONIA, for the half year ending March 31, 1906.

All Particulars may be obtained from the Manager, Mr. Edward Jones, Gas Offices, Treforest.

Tenders, endorsed "Coke" or "Sulphate," as the case may be, to be received by the undersigned on or before Monday, Aug. 28, 1905.

J. COLENSO JONES,
Clerk to the Council.

Council Chambers, Pontypridd,
Aug. 16, 1905.

STRATFORD-UPON-AVON CORPORATION.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of 5000 Tons of good Screened GAS COAL or NUTS, for delivery during the Twelve Months ending Sept. 30, 1906.

Forms of Tender and other Particulars can be obtained upon application to the Engineer and Manager.

Tenders to be sent in, and will be accepted only on the forms supplied, not later than Sept. 2, 1905.

The lowest or any Tender not necessarily accepted.

J. S. CRANMER,
Engineer and Manager.

August, 1905.

BOROUGH OF WIDNES.

THE Corporation invite Tenders for the purchase of about 1500 Tons of GAS TAR from their Gas-Works, for the Twelve Months ending Sept. 30, 1906.

Forms of Tender and Conditions of Contract may be obtained from Mr. Isaac Carr, M.Inst.C.E., Gas-Works, Widnes.

Tenders, endorsed "Tar," to be delivered to the undersigned not later than noon of the 5th prox.

The highest or any Tender not necessarily accepted.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
Aug. 15, 1905.

OSSETT CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR TAR AND LIQUOR.

THE above Corporation invite Tenders for the TAR and LIQUOR to be produced at the Gas-Works for Eighteen months from the 1st of October next. The estimated quantity per annum of Tar is 600 Tons, and of Liquor 1200 Tons.

Further Particulars may be obtained on application to Mr. Arnold E. Mottram, Engineer and Manager.

Tenders, endorsed "Tender for Tar and Liquor," must be sent to the undersigned not later than first post Tuesday, Aug. 29, 1905.

W. BROOK,
Town Clerk.

Borough Offices, Ossett.

CITY OF BRADFORD.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Bradford Corporation are prepared to receive TENDERS for the supply of best GAS COAL, COBBLES, NUTS, and CANNEL, all to be well screened, dressed, and free from Shale and Pyrites, to be delivered at the several Works of the Corporation during the period of One Year, commencing on the 1st day of October next.

Form of Tender, with any further Information required, may be had on application to Mr. Chas. Wood, Gas Engineer, Town Hall.

Sealed Tenders, endorsed "Tender for Coal," to be sent to me on or before Thursday, the 31st of August next.

The Contracts will be let subject to the Fair-Contracts Clauses of the Corporation, which may be seen at the Town Clerk's Office, and which the accepted Contractors will be required to sign.

The lowest or any Tender will not necessarily be accepted.

FREDERICK STEVENS,
Town Clerk.

Town Hall, Bradford,
Aug. 5, 1905.

CITY OF BRADFORD.

TENDERS FOR STORES.

THE Gas Committee of the Bradford Corporation are prepared to receive TENDERS for the supply of the following STORES required in their several Departments during a period of One Year ending Sept. 30, 1906—

	Probable quantity required.
Wet and Dry Gas-Meters	
Pipes and Castings	
Wrought-iron Steam Tubing	
Best Merchant Iron and Steel	30 tons.
Charging Shovels	70 dozen.
Oxide Wiskets	25 dozen.
Cotton Waste	60 cwt.
Best Engine Oil	1500 gallons.
Common ditto	1800 gallons.
Cylinder Oil	1000 gallons.
Tarred Gaskin	90 cwt.
Brass Main Gas Cocks	160 dozen.
Weed Brooms	72 dozen.
Best Lime	120 tons.
Copper Lamps	500.
Lamp Irons	300.
Sheet Glass for Street Lamps, 21 oz.	9000 sq. ft
Opal Glass for ditto, 21 oz.	3500 sq. ft.

Samples may be seen at the Mill Street Gas-Works, where Forms of Tender and any further Information required may be obtained.

The Contract will be let subject to the Fair-Contracts Clauses of the Corporation, which may be seen at the Town Clerk's Office, and which the accepted Contractor will be required to sign.

Tenders, endorsed "Tender for Stores," to be sent to me not later than Thursday, Aug. 31.

The lowest or any Tender will not necessarily be accepted.

FREDERICK STEVENS,
Town Clerk.

Town Hall, Bradford,
Aug. 5, 1905.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

THE Commissioners are prepared to receive TENDERS for the supply of about 500 Tons of OXIDE OF IRON suitable for Gas Purification purposes delivered into Waggons ex Ship, Granton Harbour, free of all charges, or in Railway Waggons (North British or Caledonian Railways), Granton Gas-Works.

Intending Contractors will be required to furnish the Engineer with the fullest information as regards the material to be supplied, the percentage of effective Ferric Hydrate ($Fe_2 O_3 H_2 O$) in the mass after the evaporation of the moisture at a temperature of 212° Fahr.

The Contractor must also state the maximum percentage of moisture in the mass on delivery at the Gas-works.

Further Particulars may be obtained upon application to Mr. W. R. Herring, Chief Engineer and Manager, Gas-Works, New Street, Edinburgh.

Tenders to be lodged, at or before Ten a.m. on Monday, the 11th day of September, 1905, sealed and endorsed "Tender for Oxide of Iron," and addressed to the undersigned.

The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh, Aug. 10, 1905.

LAMBETH WATER-WORKS COMPANY.

In the Matter of the Metropolis Water Act, 1902, and in the Matter of the Lambeth Water-Works Company, in liquidation.

Whereas the undertaking of the above-named Company was under the above Act transferred to the Metropolitan Water Board on the 24th of June, 1904, subject to all debts, obligations, and liabilities, and the Company are about to apply to the Board of Trade for a Certificate with a view to dissolution.

NOTICE is Hereby Given, that any persons having any CLAIMS against the said Company which may be payable by them are hereby required to send the Particulars, in writing, of such claims to the undersigned, the Secretary of the Company, on or before the 15th day of September, 1905, after which date the Directors of the Company, as Liquidators, will proceed to distribute the assets of the Company amongst the persons entitled thereto, having regard only to the claims of which they shall then have had notice, and will not be liable to any person of whose debt, claim, or demand they shall not then have had notice.

Dated this 7th day of August, 1905.

H. WILKINS,
Secretary.

Lambeth Water-Works,
Brixton Hill, S.W.

IMPORTANT EXHIBITION
OF
APPLIANCES FOR GAS LIGHTING, HEATING, COOKING, AND POWER.

TREDEGAR HALL, NEWPORT, MON.,
October 16 to 28 next.

Promoted by the
NEWPORT (MON.) GAS COMPANY.

A LIMITED number of Spaces are Vacant, and Applications are invited from Manufacturers of Fittings and Novelties for Gas-Lighting purposes.

A small inclusive charge is made for the space occupied, Advertisement in Catalogue, and Gas required for purposes of display.

All Particulars on application to T. H. HAZELL, Secretary, Gas Company, Newport, MON.

THE HARROW AND STANMORE GAS COMPANY.

NOTICE is Hereby Given, that the Ordinary Half-Yearly Meeting of the Proprietors will be held at The Albion Tavern, Aldersgate Street, in the City of London, on Monday, the 4th day of September, 1905, at twelve o'clock precisely, to receive the Directors' and Auditors' reports, to declare a dividend, and to transact any ordinary business of the Company.

The Register of Transfer Books WILL BE CLOSED from Aug. 28, until Sept. 4, both inclusive.

By order of the Board,
J. L. CHAPMAN,
Secretary.

Gas Office, Roxeth, Harrow,
Aug. 18, 1905.

By Order of the Directors of the
BOGNOR GASLIGHT AND COKE COMPANY, LIMITED.

520 SHARES OF £5 EACH IN THE BOGNOR GASLIGHT AND COKE COMPANY, LIMITED,
WILL BE SOLD BY AUCTION
IN LOTS OF FIVE AND TEN SHARES EACH
BY
REYNOLDS AND CO., at the Norfolk HOTEL, BOGNOR, on Saturday, the 26th day of August, 1905, at four o'clock p.m. precisely.

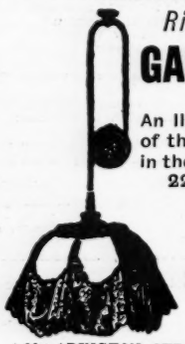
Particulars and Conditions of Sale may be obtained of Mr. W. HAMMOND, Secretary to the Company, at the Office, Argyle Road, BOGNOR; at the Norfolk Hotel, BOGNOR; and of the AUCTIONEERS, at their Estate Offices, 27 & 29, High Street, BOGNOR.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

THE "HANWELL" PATENT
Rising and Falling
GAS PENDANT



An Illustrated Description of this Pendant appeared in the "Journal" for Nov. 22, 1904 (page 599).

Write for full Particulars to the
"HANWELL" Pendant Company,
96,a ABINGTON STREET, NORTHAMPTON.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE LIMITED,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

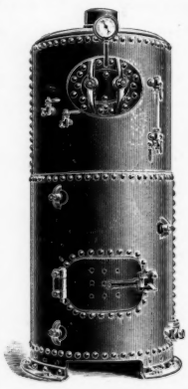
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: H. CRESSWELL & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

GILBERT LITTLE CO'Y LTD.
Conveyor and Elevator Specialists,
Smethwick, Birmingham.
Make known your wants for Conveyors and Elevators to GILBERT LITTLE, the Pioneer Specialist: he will supply them.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

THE
Grantham Crank & Iron Co., Ld.
GRANTHAM.



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STEAM BOILERS
(of all types and powers).
Vertical, Loco, Cornish, and Lancashire.
FEED-WATER HEATERS.
VERTICAL ENGINES.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

Gas Companies are solicited to try Samples of the
MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton
Prices and analysis on application.
The MIRFIELD (GAS-COAL) COLLIERIES CO.,
RAVENSTHORPE, NEAR DEWSBURY.

SHARES FOR SALE.

VALUABLE SHARES
IN THE
NEW CONVEYOR CO.,
LIMITED,
FOR SALE.

Apply to—
J. ROSS-TODD, 250, Gilliott Road,
Edgbaston, BIRMINGHAM.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

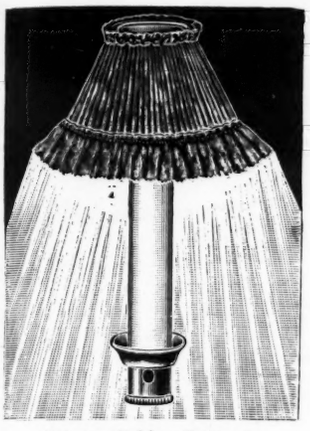
For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

THE
"ROTARY"
STATION METER.
Efficiency
Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

Wrought-Iron
TUBES
And Fittings & Accessories.
LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS, GAS VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.



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GAS-LIGHT CANDLE.

The most decorative Gas-Light ever offered.

A perfect combustion Burner.

Cannot get out of order.

60-Candle Power with 2½ cubic feet of Gas.

Can be used anywhere instead of a "C" Burner.

Address of your nearest Wholesale Factor will be sent on application to No. 4374, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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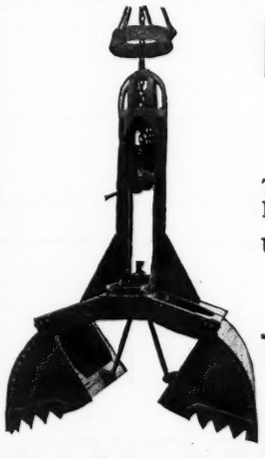

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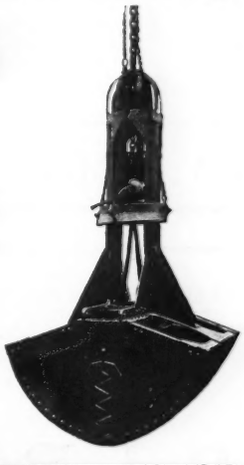

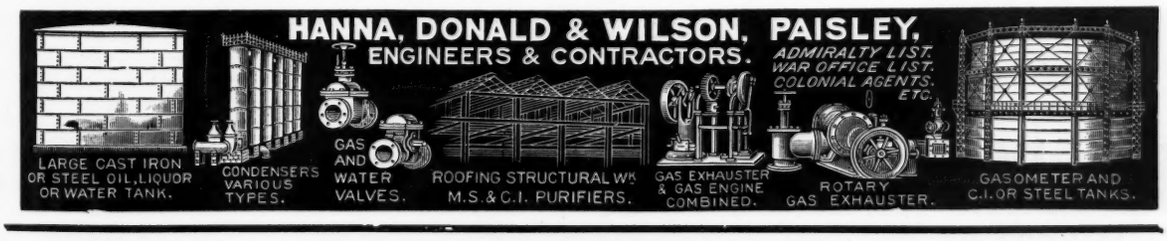
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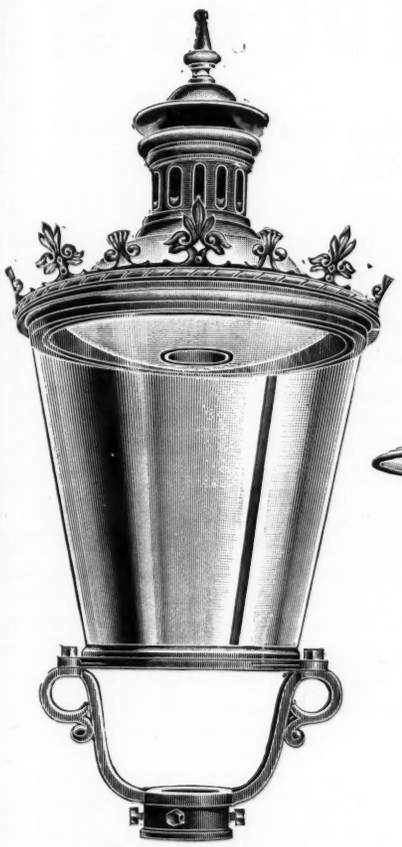

Fig. 35. 100 c.p.

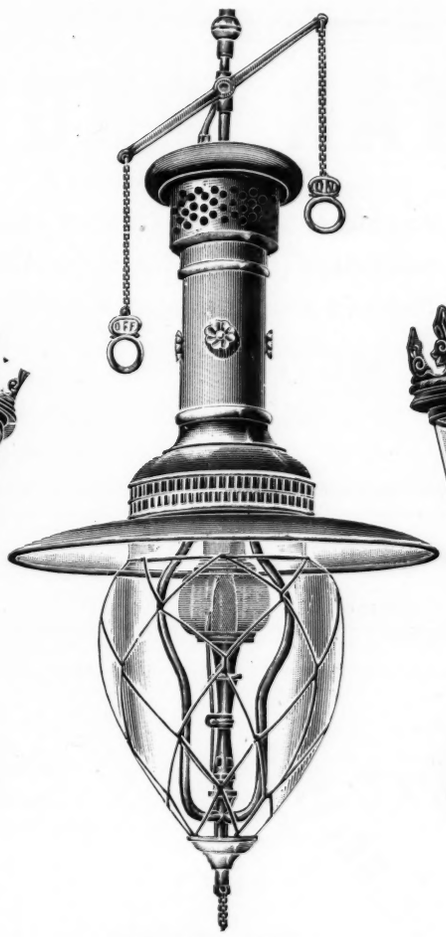

Fig. 607. 600 c.p.
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Fig. 35a. 300 c.p.
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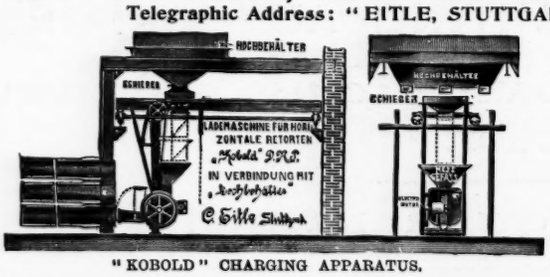

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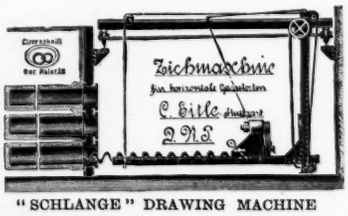

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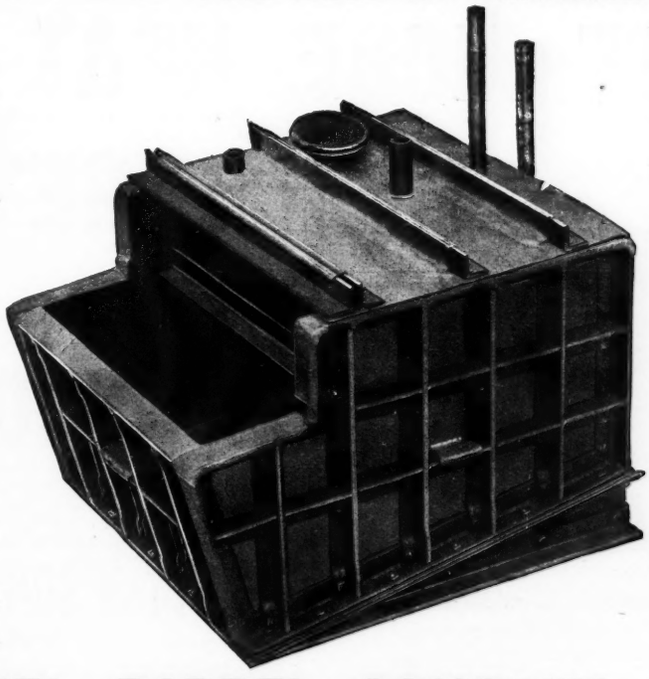

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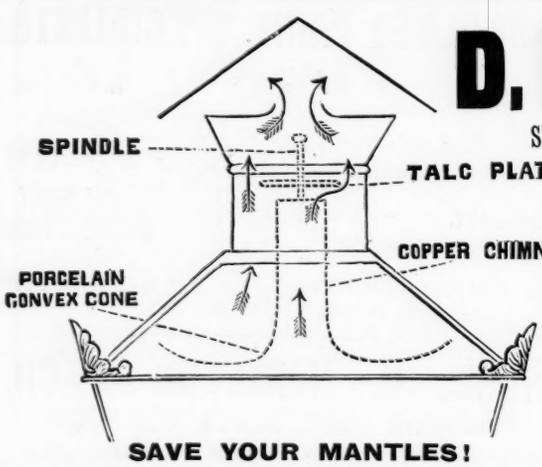

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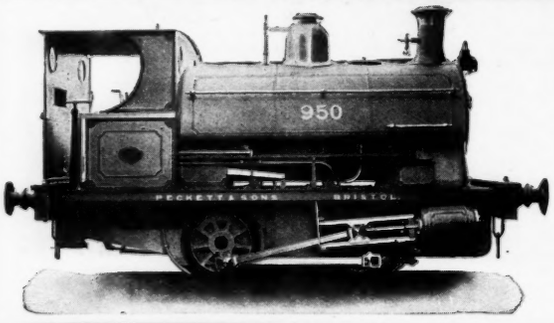

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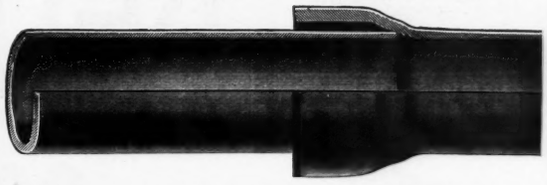

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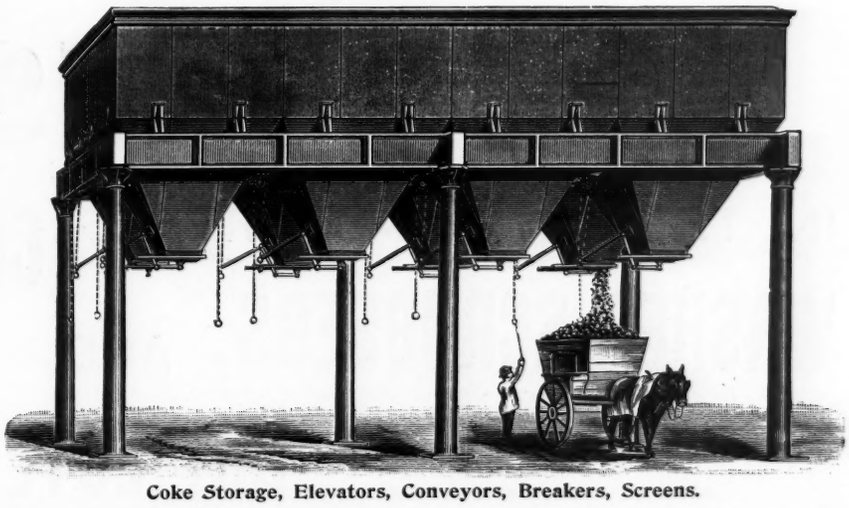

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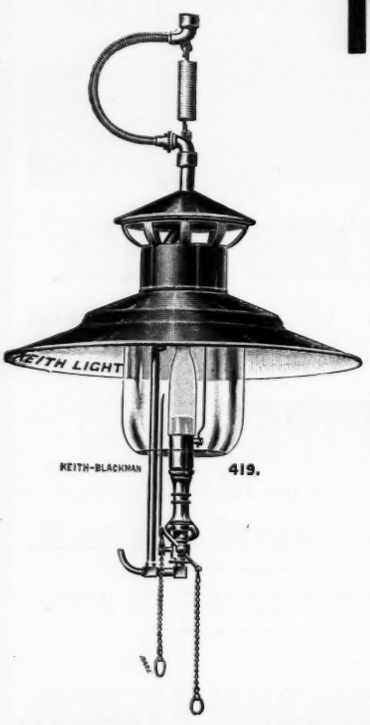

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